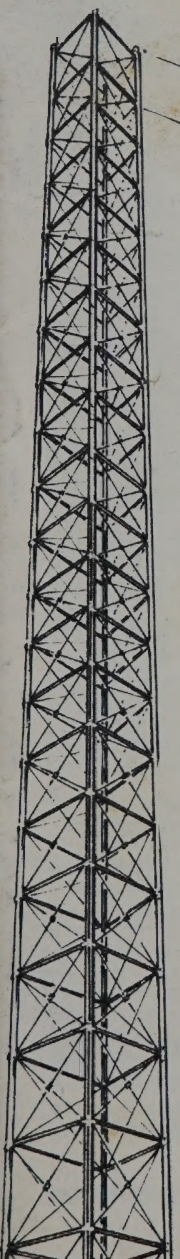
The OTB

THE OLD TIMER'S BULLETIN FEBRUARY 2003 VOL. 45 / #1

OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the collector, historian and old-time radio operator



WIRELESS WITHOUT RADIO WAVES

SEE P. 44

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.
BRUCE L. KELLEY 1914-1997, FOUNDING EDITOR

WEB SITE: http://www.antiquewireless.org
Antique Wireless Association, Inc. is an IRS 501(c)3 charitable organization.

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AWA ELECTRONIC COMMUNICATION MUSEUM: Please see "Museum News" column for contact and administration information.

ANTIQUE WIRELESS ASSOCIATION, INC.
BOX E, BREESPORT, NEW YORK 14816

The Old Timer's Bulletin is published approximately four times a year by and for members of the Antique Wireless Association, Inc. AWA is a nonprofit historical society founded in 1952 and chartered by the State of New York. *The Old Timer's Bulletin* is available through AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. It is not liable in any way for any buying-and-selling transaction entered into as a result of its content.

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THE PRESIDENT'S MESSAGE

Greetings and Happy New Year

I would like to take this opportunity to introduce myself. My name is Geoffrey Bourne and have just been elected to be your President. I live in St. Albans, WV, a suburb of Charleston, the state capital. My interest in radio dates way back to third grade when my family and I moved to a new house. The previous owners had left an old radio in the basement and, being the inquisitive type, I had to see if it worked. So began a lifelong interest in radio. Over the years the interest would come and go, but I still have that first radio.

I joined the AWA back in the early 1980s so I could attend my first meet in Canandaigua.

Over the years I became more involved with the antique radio collecting hobby. Among my previous positions were Director, Antique Radio Club of America (ARCA); President, West Virginia Chapter of ARCA; Founding President, Museum of Radio and Technology, Huntington WV; AWA Old Equipment Contest Coordinator and, most recently, Director/VP AWA. I hope to continue to promote this great hobby and get more people involved with our organization.

I would also like to take this opportunity to thank the Board and officers of the AWA for there vote of confidence. I know that I have large shoes to fill and I am up to the job. A big thank you goes to Bill Fizette for all of the hours of work that he put into this organization.

I look forward to working and meeting our members and volunteers, both at the annual conference and during the year. The AWA needs more of you to get involved with this great organization. Without you there would be no AWA. Please feel free to contact me at home by phone, mail or e-mail. But please no calls after 9:30 p.m. if possible.

Geoffrey Bourne
405 8th Avenue
St. Albans, WV 25177
(304)722-4690
GCBOURNE@CITYNET.NET

(continued on page 7)

Outgoing President Bill Fizette passes the gavel to incoming President Geoff Bourne at the AWA, Inc. Board meeting in Rochester, NY, November 10, 2002. Bruce Roloson photo.

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB *staff or the Antique Wireless Association.*

PICKARD PATENT NEEDED

Can someone help me find the patent number for G.W. Pickard's "oscillating crystal receiver" invention?

ALFRED STOLL
Reichenberger Str. 76
D-65510 Idstein, Germany

OTB TITLE CHANGE PRO AND CON

Regarding David Kraeuter's proposal to change the title of *The OTB* (November, 2002 "Letters" column), don't do it! As a professional librarian, I'd say that one of the biggest nuisances libraries face is eternal tinkering with titles of pe-

FROM THE EDITOR

The AWA Message Board

Like many other radio and hobby clubs, The AWA has to face the problem of dealing with declining membership. This is an era when people have to work harder for less income and our society offers many activities to compete for limited leisure time. We have a high percentage of retiree members who do have more leisure, and are old enough to have been bitten by the radio bug at a time when many of the sets we now collect were new and exciting products. But, as the regular entries in the Silent Keys column attest, we have to say goodbye to more of them every year.

One of the best tools we have for acquainting younger potential members with the lure of antique communications hardware and history is our web site. It has become a valuable outreach tool with a proven track record in converting browsers to members. Our Secretary tells me that the site is now our biggest source of new memberships.

Anything we can do to increase the effectiveness and outreach potential of the web site is bound to pay off in still more new membership applications—and we've just come up with a great enhancement: The AWA Message board. Chuck Schwark, our Web Site Coordinator has installed bulletin board software that makes it possible for visitors to the site—members and non-members alike— to ask questions about antique radio and post answers to the questions of others.

We hope that our members will plan to visit the site regularly and spend a little time sharing their expertise by posting answers—particularly to questions raised by obvious newcomers. The time you spend helping a newcomer will not only give you pleasure, but make our club stronger and more appealing to the neophyte.

Probably the best way to better acquaint you with the mission of The AWA Bulletin Board is to quote from the introductory statement posted on the board itself.

This bulletin board is provided as a service to antique radio historians, collectors and restorers, whether AWA members or not. Please feel free to post here any questions you may have concerning radio history, radio identification or radio restoration. Searches for parts or documentation are welcome, but please do not put up "for sale" or "available on e-bay" notices. Both AWA members and non members are encouraged to post answers to questions within their areas of expertise, but The Antique Wireless Association will not be liable for any losses or problems arising from the application of any information found on this board.

If you have comments or questions about AWA itself: its history, functions or policies, please do not post them here. You are invited to browse this web site for more information and/or send comments to the person dealing with your specific interest using our "Contact Page." This is a moderated bulletin board. To preserve its character and save bandwidth, it will be restricted to the types of postings described above.

Our new bulletin board provides every AWA member having on-line capability with a powerful tool for enhancing the outreach and influence

(continued on page 7)

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riodicals. What is the "change mania" that seems to have taken over this country? We have a large bank in this area that merges every year or so and has changed names three times in the past decade. Maybe I'm getting to be an old curmudgeon, but I wish all these whining politically correct yuppies would take all their "deeply felt concerns" and move someplace else!

T.L. TALLENTIRE
Aurora, IN

I agree with David Kraeuter's letter in the November 2002 *OTB* about changing the *OTB* name. When I mentioned that I was writing something for *The Old Timer's Bulletin*, a friend assumed that it was a senior citizen's magazine. Only then did it hit me that the name said nothing about radio. Like Mr. Kraeuter, I am not passionate about it, but if it were changed, how about "The Old Time Radio Bulletin," or just "Old Time Radio," if these names are not already in use? Those names describe the subject, not the reader, and are more suitable for search programs using key words.

HENRY M. BRADFORD
Wolfville, N.S.
Canada

Whew!! What can we add to "T.L."'s letter? However, it's worth mentioning that Dave

Kraeuter is also a professional librarian.

Henry Bradford makes an excellent point, and one I hadn't thought of before, about our current title being "invisible" to those searching the 'net by key word for items about antique radio.

—MFE

GROTE REBER'S CONTRIBUTION

I've just learned of the death of Grote Reber. (see *"Silent Keys,"* this issue). Many, many years ago, Grote (a friend of Bruce Kelley's) gave his radio collection to AWA to be sold. At that time it was in storage somewhere in New Jersey I believe. No one knew for sure what was there.

George Batterson and his trucking firm moved the collection to Henry Blodgett's barn near Bloomfield. I still remember the cold (around zero) snowy day when Lauren Peckham, Dex Deeley, Dick Ransley, Bruce Roloson, Ted Kerrick, Chuck Brelsford, and Bruce Kelley went up there to open the sealed boxes and do an inventory.

The wind was howling and the snow was blowing. Inside the cold barn, it was like Christmas as the boxes were opened. I stayed out there with them until my fingers were so numb that I couldn't hold the pencil any longer. (I was making the list.)

The OTB carried an announcement of the sale. A mail auction was held and the new owners picked up their items at the Sheraton in Canandaigua. AWA recieved several thousand dollars.The proceeds went to the AWA museum fund and was the first large contribution to that endeavor. Kelley used this money for years to build shelves, buy and install lights, install bathrooms, etc. in the present museum building.

We are certainly indebted to Grote. His contributions went far beyond his work in radio astronomy. Who knows if we would even have an AWA Museum if Kelley and his crew had not had money to do the basic building needed.

Happy New Year to all!!

Joyce Peckham, Secretary, AWA, Inc.
Breesport, NY

FORT MONMOUTH RADIO MUSEUM

Someone should visit the military radio museum at Fort Monmouth, NJ, photograph some of the 70 or 80 interesting sets, and do an article for *The OTB*.

ALAN MARK
Pembroke, MA

I agree. I've heard it's a great museum. And we have lots of knowledgeable members in and around New Jersey. Any takers?—MFE

OTB TIP BOOK

Over the years, lots of great articles on repair/restoration have appeared in *The OTB*. I wonder if anybody ever thought of making them into a book. Many times, I remembered a particular tip, but not which issue it was in. Schematics and manuals are great, but they don't always help solve specific problems.

Richard P. Hurlbut
Toronto, Ont. Canada

Bill Fizette, our past President, has often mentioned that such a collection of tips from The OTB *should be published. Now that he's a "civilian" again, maybe he'll find time to put one together!—MFE*

COLPITTS "OUT OF TUNE"

Several sharp-eyed readers have noticed the drafting error in my article "Variable Frequency Oscillators—The Colpitts Way (p.38, Fig. 2) in the November, 2002 issue of *The OTB*. There should be a .01 uFd bypass capacitor to ground from the screen grid of the 6AG7 and not a direct ground as shown. My apologies!

John Rollins, W1FPZ
Arrowsic, ME

OHIO RADIO TALK

OTB readers in the area might be interested in my upcoming lecture: "Radio—the Stylistic and Social Impact in the 20th Century Home." It will be given on March 13, 2003 at 1 p.m. at the Fairview Park Library, 21255 Lorain Rd., Fairview Park, Ohio 22126.

Barbara Havranek
bhavranek@hotmail.com

OVER-ENTHUSIASTIC STATEMENT

In a recent e-mail, former OTB *and* Review *Editor Lud Sibley objects to a statement made by current* Review *Editor Tom Perera in his present issue. He feels that Tom exaggerated the contribution of Bill Fizette, Tom's immediate predecessor as Editor, by implying that Bill had a strong editorial and/or supervisory influence on all previous issues. By doing this, Lud feels, Tom was downplaying the role of past* Review *Editor Bob Morris, who brought to the job his experience in editing high-level professional journals, not to mention the role of Lud himself, who edited*

many Review issues *with no supervision.*

Tom explains that he was new to the publication and simply wanted to be sure to give proper and gracious credit to his predecessor—who was certainly very much involved with the Review, *in one way or another, through many of its issues. While that particular wording may have gone a bit overboard, it can't now be erased. However, each individual issue of the* Review *properly credits those who produced it. In addition, there is a brief publishing history of* The Review, *mentioning past editors, in the just-released AWA 50-year commemorative booklet*

—MFE

PIONEERING GERMAN TV FIRM

Dr.Franz Pichler's article (November 2002 issue) about early German television is fascinating, but it could have said more about Fernseh AG, which was the first company in Germany to be solely devoted to television. It was founded in June 1929 jointly by four parent companies: Robert Bosch AG of Stuttgart, Loewe Radio GmbH of Berlin, Zeiss Ikon AG of Dresden and the Baird Television company of London, England.

Among the pioneering developments by Fernseh was what came to be known as the "intermediate film process" which got around mechanical camera problems by filming scenes with a 16 mm movie camera and then quickly developing the film and scanning it for television. A mobile system was built in a large van with the camera mounted on the roof; this was demonstrated at the Berlin Radio Exhibition in 1932. Dr.Pichler states that the process was operated "from 1935 on" by the Reichsrundfunk Gesellschaft, but Fernseh developed it first.

On a business trip to Germany in August 1930, John Logie Baird met with Manfred von Ardenne, who helped to persuade him to move his research away from mechanical methods and towards the use of cathode ray tubes. Von Ardenne lived until just a few years ago, active to the last. He was interviewed for a television documentary on Baird, which is to be shown in the U.K. within the next few months. The connection between the Baird Television Ltd. and Fernseh was broken soon after August 1935 when the German government placed all television research under military control.

Malcolm Baird (son of John Logie Baird)
Dundas, Ontario, Canada

PRESIDENT'S MESSAGE, *continued from page 4*

From the Outgoing President

At the November meeting of the AWA Board of Directors I tendered my resignation as president of the AWA after serving for seven years. The new president, as you now know, is Geoff Bourne, of St. Albans, WV.

Geoff is a seasoned administrator with considerable experience within the management circles of the AWA. He has served as both 2nd and first Vice-President, and has for several years been in charge of the Conference Old Equipment Contest, after being chosen by Ralph Williams as his successor. His knowledge of the subject matter is impressive, and he has the full support of the Board of Directors as he takes over his demanding task.

Serving as President of this wonderful organization has been rewarding as well as challenging. I wish to thank all those who supported the office and the programs of the AWA over the years, and I know that we all wish Geoff every success.

—William B. Fizette, W2DGB

FROM THE EDITOR, *continued from page 5*

of the Antique Wireless Association. Please visit frequently to contribute your answers and comments—and your questions, too! Look for "The AWA Message Board" button on our website main page.

Obviously, it will take a little time to make this bulletin board come alive. We don't expect for there to be a tremendous amount of activity right away. But keep in mind that this feature will be more of a detriment than an enhancement if newcomers who do post questions don't get answers in a reasonable time!

By the way, our web site just received its fourth award for design excellence; this one from the International Association of Web Masters and Designers. You'll see it proudly displayed on our site's main page.

Questions or comments? Contact me (contact info on p. 2) or e-mail Chuck Schwark at CASchwark@aol.com.—*MFE*

AWA NEWS

OTB **POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

January 31-February 1
HVRA/AWA Annual Convention

March 20-22
Carolinas Chapter, AWA
Spring Meet in the Carolinas

April 5
Sarasota ARC Spring Swap Meet

May 2-3
IHRS/AWA Spring Meet

May 3
AWA Museum Board Meeting

May 3
AWA, Inc. Board Meeting

May 16-17
Radio Daze 2003

August 20-23
AWA Annual Conference

November 9
AWA, Inc. Membership and Board Meeting

November 9
AWA Museum Membership and Board Meeting

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

VINTAGE RADIO AND COMMUNICATIONS MUSEUM OF CT

2003 Swap Meet Schedule

All meets to be held at the Museum, located at 33 Mechanics St., Windsor, CT. Dates: February 8 (indoors), June 7 (outdoors), September 13 (outdoors), December 6 (indoors). Contact: John Ellsworth, Museum Director, at radioclctr@aol.com or (860) 673-0518.

24TH HVRA/AWA ANNUAL CONVENTION

January 31-February 1

Note: The dates of this meet fall before most members will receive this issue of *The OTB*, so this listing is provided for the record only. The meet is to be held at Auditorium Building "B", Fort Bend County Fairground, Rosenberg, Texas. Friday's activities include a paper and tube auction as well as an auction of small radios, test equipment and tools. Saturday's activities include the contest (theme: Emerson) and auctions for wood sets, consoles, parts sets and leftovers. Info: Bill Werzner at (713) 721-2242 or mingqui53@earthlink.net; also see HVRA web site at www.hvra.org/

RADIO XXXIV

February 16

Sponsored by the Greater Boston Antique Radio Collectors, this giant indoor old radio flea market will be held at the Westford Regency Inn at Westford, MA (I-495 at exit 32) from 8 a.m. to 1 p.m. For room reservations, call the Inn at 1-800-543-7801. Mention Radio XXXIV for special rates if you register before January 31. Last year's show had over 72 exhibitors at over 100 tables. Admission, $8.00 (spouse and children free). Exhibitors pay $8.00 per person plus $24.00 per table and pre-registration is encouraged. For further information, contact Pat Wedge at Antique Radio Classified, P.O. Box 2-W20, Carlisle, MA 01741, (866) 371-0512, arc@antiqueradio.com

RADIOFILEXPO 2003

March 11-17

The announcement for this French event was, not surprisingly, entirely in French, so I can't provide full details. However, dusting off my high-school skills and doing the best I can, it would appear that it will be presented by the AEA (Amis Du Musee De L'ElectroAcoustique) held at Charvieu-Chavagneux (near Lyon) and includes a flea market. Attending the event will cost you two Euros (members of the participating clubs enter free upon showing membership cards). If your French is better than mine and you want details, send a self-addressed envelope and an IRC to AEA Expo, BP22, F-92222, Bagneaux, FRANCE. Oh...parking is free.

SPRING MEET IN THE CAROLINAS

March 20-22

Presented by the Carolinas Chapter of AWA at the Sheraton Charlotte Airport Hotel, I85 at Exit 33, Charlotte, NC. For program details, please see "With the Chapters" elsewhere in "AWA News," visit the CC-AWA web site at cc-awa.org, or contact CC-AWA President Ron Lawrence at P.O. Box 3015, Matthews, NC 28106, KC4YOY@trellis.net, or 704-289-1166. For hotel reservations, phone (704) 392-1200 and ask for the special conference rate. You can also e-mail your reservation request to crystal-

crystal.bryson@ihrco.com. Include your phone number in the message and you'll be called back with a confirmation within 24 hours.

SARASOTA ARC SPRING SWAP MEET

April 5

At the Sarasota Lions Club, 120 S. Tuttle Ave., Sarasota, FL. 7 a.m. - 11 a.m. Info: Jack Warren (941) 349-4875; Dave Hurt manager@findsales.com

IHRS/AWA SPRING MEET

May 2-3

Indiana Historical Radio Society and AWA present their 32nd annual regional radio festival. The meet will be held at the Johanning Civic Center located at 1500 North Reed Road (US-31) on the north side of Kokomo, Indiana. Many restaurants and motels are within a very short drive. A snack bar will be provided by the Civic Center. Tentative set up times: 2 p.m. Friday with swap and sell from about 4 p.m. to 8 p.m., then Saturday from 7 a.m. to 3 p.m. There is plenty of space to set up inside the very large new facility. Vintage radio contests and radio operational and repair seminars are scheduled. For additional information call Fred Prohl, 812-988-1761 or email him at indianahistoricalradio@att.net. The IHRS web site is at www.indianahistoricalradio.org

AWA SPRING MEET

May 3

"Dawn Till Gone" at the A.W.A. Electronic Communication Museum Annex building, 6910 Rt. 5 & 20 (intersection with Rt. 444), Bloomfield NY—on the grounds of the American Legion Post. For details, see "Museum News" in this issue. Questions to Ed Gable, Museum Curator, at (585) 392-3088 or k2mp@eznet.net

AWA MUSEUM BOARD MEEETING

May 3

1 p.m. at same location as AWA Spring Meet.

AWA, INC. BOARD MEETING

May 3

About 2 p.m. (following Museum board meeeting), same location.

RADIO DAZE 2003

May 16-17

Sponsored by the Northland Antique Radio Club, AWA, and Pavek Museum of Broadcasting. At Comfort Inn of Plymouth, I94 and Highway 55, Plymouth, MN (763) 559-1222. Mention NARC for special room rates. Flea market begins at dawn on Friday and Saturday. Auction, contest, luncheon. Saturday program features a talk by Martin Blankinship, noted Zenith collector. For more information: Contact Jim Thompson (612) 822-4000, Ed Ripley (651) 457-0085, NARC, P.O. Box 18362, Minneapolis, MN 55418, or see NARC website: geocities.com/TelevisionCity/4544/

AWA ANNUAL CONFERENCE

August 20-23

At Rochester Institute of Technology Conference Center (formerly Thruway Marriott). I-90 Exit 46 to I-390 North to NY 253 West to NY 15 South. RIT info number: (585) 359-1800.

AWA, INC. MEMBERSHIP AND BOARD MEETING

November 9

At RIT Conference Center (see above). Membership meeting at 11 a.m. All members welcome. Board meeting follows.

AWA MUSEUM MEMBERSHIP AND BOARD MEETING

November 9

Same location as above. Membership meeting (all members welcome), followed by Board meeting, begins at conclusion of AWA, Inc. board meeting.

Recurring Meetings & Events

•Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

•California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

•CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cincinnati) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

•Carolinas Chapter of the AWA—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets ap-

proximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

•Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

•Cincinnati Antique Radio Society—Meets at 7:30 p.m., third Wednesday of each month, at Great Oaks Institute, Scarlet Oaks Campus,, 3254 E. Kemper Rd., Sharonville, OH 45241. For info and directions, call Tina Hauke at (513) 771-8840.

•Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Bill Overbeck at (610) 789-8199 or Dave Snellman at (215)

With the Chapters

CC-AWA CHAPTER NEWS

Wow, it's time to write another installment of the CC-AWA Chapter News for *The OTB*. You know I've heard old folks all my life say how time passes faster the older you get, well I guess I'm starting to understand what they were talking about, because this year I too, like the AWA turned 50. It seems like it was just last week that the Editor was pestering me about being late with my write-up. And here I am again, it's 2:45 a.m. in the morning and I'm sitting in front of the PC. It seems like I've spent a lot of the last couple of weeks right here trying to get things ready for the upcoming CC-AWA Annual Conference.

This year's Thursday afternoon program session is going to be all Repair/Restoration & Preservation topics, with the exception of the CC-AWA Annual Membership meeting. My good friend Ted Miller is helping setup the "Hints & Kinks" session where a number of presenters will talk about various methods of R/R&P. Some of the things covered will be ways to use an Ultrasonic cleaner, repairing broken parts such as pot metal, cleaning and preserving wood cabinets without refinishing them, nickle plating hardware, etc. And Mark Opatt is going to follow it all up with a talk on repairing speakers.

For a number of years now a growing group of us have gone to dinner after the last conference forum, to a local Italian restaurant called the Open Kitchen. It's a Charlotte landmark that like me and the AWA is 50 years old this year. This year, we're going to make going to the OK an official part of the Conference, so it's on the "official" schedule. the Sheraton's airport shuttle bus will provide transportation so folks from out-of-town won't have to worry about directions.

At 8 p.m. Thursday evening Mark V. Stein, noted radio book author, will be giving a talk and signing his books. Friday morning we will continue our tradition of enforcing our 8 a.m. start time. I really don't think it's fair the way some other meets are not sticking to their schedules and letting vendors set up and sell early. Our now famous "LeMans Start" has been copied by several other groups.

Again this year, in an effort to encourage locals, young people and those not "into" the hobby enough to take time off from work to attend on Thursday and Friday, we will offer our "Special Saturday Only" admission of just $5.00. This will also go along with our continuing effort to promote "Radio Rescue." This is where we encourage folks to search their attics for radios and bring them to the Conference where experts can tell them what they have and give them some idea as to worth. If they are interested, they can include the items in our "end of swap meet" auction.

As we have done for several years, anyone that has attended the Conference in the last say nine years will receive a brochure in the mail, as will all CC-AWA members. Current dues-paying members of the "Carolinas Chapter" will be automatically pre-registered for the Conference for free. All the details about the CC-AWA Annual Conference can be found on our web page at cc-awa.org, including a printable pre-registration form and instruction for paying your Conference Registration fees using your credit card on-line with PayPal. I hope everyone had a safe and happy holiday season and we look forward to seeing everyone at the 27th Annual CC-AWA Annual Conference, the "Spring Meet in the Carolinas," On March 20-22 at the Sheraton Charlotte Airport Hotel in Charlotte, NC.

Ron Lawrence
CC-AWA President & Conference Chairman

345-4248. Club mailing address: P.O. Box 847, Havertown, PA 19053.

•The Downer's Grove (IL) Park District Museum sponsors a monthly "Collector's Hour." Participants have the opportunity to display collections at the facility for several weeks before making their individual presentations. The event is open to the public with no admission charge. The museum has also begun to sponsor a yearly "Collector's Fair." For more info, contact Mark Harmon, The Downer's Grove Park District Museum, 831 Maple Ave., Downer's Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

•Houston Vintage Radio Association—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership $15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

•Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

AWA NETS (EASTERN TIME)

PHONE:
SUNDAY:
7244 kHz, SSB, noon (NCS:WA4IAM);
3837 kHz, AM 4:30 p.m.
NCSs:W2ZM & W2AN)

TUESDAY:
14274 kHz, SSB, 2:30 p.m. (NCSs KC3YE and W0FXY)
3837 kHz SSB, 8 p.m. (NCS WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:
3867 kHz, SSB, 9:30 a.m. (NCS: W2OBJ)

CW:
DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up.
First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 145.290 MHz
Transmit 144.690 MHz

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE

Cost: $400 (U.S.)/$500 (Elsewhere)
Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816.
Phone (607) 739-5443.
E-mail:awapeckham@ aol.com.

•London Vintage Radio Club—This Ontario, Canada club meets in London on the last Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada. (519) 638-2827.

•Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Ed Lyon, 11301 Woodland Way, Myersville, MD 21773-9133, (301) 293-1773, e-mail lyon@fred.net or Membership Chair, Paul Farmer, (703) 960-0650, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

•New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell PI., Manalapan, NJ 07726, (732) 446-2427.

•Northwest Vintage Radio Society—Meets second Saturday of each month (except July and August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Meets second Saturday each month, Hometown Buffet, 1012 S.W. 74th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or call (405) 755-4139 or (405) 732-6070; or e-mail fkarner@mmcable.com.

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: $10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in

ANTIQUE WIRELESS ASSOCIATION PROFIT AND LOSS
NOVEMBER, 2002 THROUGH OCTOBER, 2002

Ordinary Income/Expense	
Income	
6073C _ AWA REVIEW 14	27.50
6100C _ MEMBERSHIP BY CREDIT CARD	3,739.01
6007C _ MISCELLANEOUS INCOME - CLUB	75.15
6010C _ CLUB MEMBERSHIP DUES	54,223.76
6020C _ INT ON BANK ACCOUNTS - CLUB	9,522.46
6036C _ CONTRIBUTIONS - CLUB	39.01
6045C _ SALES	
6055C _ GENERAL BOOK SALES	750.00
Total 6045C _ SALES	750.00
6800 _ CONFERENCES	
6800C _ CONFERENCE - GENERAL	24,733.70
6803C _ CONFERENCE PREREGISTRATIONS	22,836.00
6800 _ CONFERENCES - Other	354.95
Total 6800 _ CONFERENCES	47,924.65
Total Income	116,301.54
Cost of Goods Sold	
8100 _ COST OF BUTTONS SOLD	0.00
Total COGS	0.00
Gross Profit	116,301.54
Expense	
8350 _ AWA REVIEW 15 COSTS	11,885.14
8500C _ DONATIONS - MUSEUM	2,855.33
8000C _ OTB EXPENSES	
8040C _ OTB PRINTING AND ASSEMBLING	18,692.67
8045C _ OTB - ENVELOPES	1,305.00
8047C _ OTB - STUFFING & MAILING	514.90
8050C _ OTB - STAMPS	21,200.00
Total 8000C _ OTB EXPENSES	41,712.57
8001C _ BANK SVC CHARGE	434.64
8004C _ HF CONTESTS	81.94
8011C _ CREDIT CARD CHARGES	650.66
8030C _ INSURANCE - OFF. & DIR. LIAB.	1,393.00
8041C _ OTB CD-ROM PROJECT	499.00
8055C _ POSTAGE MACHINE & MAILING	654.24
8065C _ OFFICE SUPPLIES - CLUB	1,083.51
8067C _ ACCOUNTING	1,822.00
8068C _ LEGAL	444.53
8060C _ GENERAL POSTAGE- CLUB	518.31
8091C _ BOARD MEETING COSTS	1,401.47
8092C _ BOARD MEETING TRAVEL	167.94
8115C _ ADVER. AND PHOTOGRAPHY	3,340.58
8160C _ TELEPHONE - CLUB	1,063.31
8191C _ MISC. EXP. - CLUB	665.01
8192C _ AOL SERVICE - SECRETARY	475.81
8300 _ CONFERENCE EXPENSES	
8300C _ CONFERENCE	125.00
8302C _ CONFERENCE - AUCTION PAYOUTS	14,453.85
8303C _ CONFERENCE SUPPLIES	474.05
"8304C _ CONFERENCE TRANS - BUS, SHUTTLE	3,565.00
8305C _ CONFERENCE AWARD MATERIALS	1,856.55
8306C _ CONFERENCE FORMS - PRINTING	914.29
8307C _ CONFERENCE BADGES	641.18
8308C _ CONFERENCE SECURITY	1,485.00
8309C _ CONFERENCE REG. REFUNDS	949.00
8311C _ CONFERENCE HOTEL BILL	13,914.96
8300 _ CONFERENCE EXPENSES - Other	40.00
Total 8300 _ CONFERENCE EXPENSES	38,418.88
Total Expense	109,567.87
Net Ordinary Income	6,733.67
Other Income/Expense	
Other Income	
9500 _ Unrealized Gain (loss) on Inves	-11,416.55
Total Other Income	-11,416.55
Net Other Income	-11,416.55
Net Income	-4,682.88

ANTIQUE WIRELESS ASSOCIATION, INC.
BALANCE SHEET AS OF OCTOBER 31, 2002

ASSETS	
Current Assets	
Checking/Savings	
1078 _ HSBC CHECKING- CLUB	9,995.79
Total Checking/Savings	9,995.79
Accounts Receivable	
1300 _ ACCOUNTS RECEIVABLE	
1335 _ DUES	3,600.00
Total 1300 _ ACCOUNTS RECEIVABLE	3,600.00
Total Accounts Receivable	3,600.00
Other Current Assets	
Certificates of Deposit	
1102C _ CHASE 48 MONTH CD	26,570.63
1102 _ CHASE - 24 MO. CERT.-MUSEUM	6,772.59
1103 _ CHASE - 36 MO. CERTIFICATE-CLUB	21,409.33
1105 _ CHASE - 24 MO. CERT.-CLUB	18,361.44
Total Certificates of Deposit	73,113.99
1400 _ PREPAID EXPENSES	
1415 _ ROCH. HAMFEST	148.75
1490 _ MISCELLANEOUS	385.00
1420 _ ENVELOPES - OTB	300.00
1410 _ ENVELOPES - GEN. CORRESPONDENCE	310.00
1405 _ STAMPS	5,000.00
Total 1400 _ PREPAID EXPENSES	6,143.75
Total Other Current Assets	79,257.74
Total Current Assets	92,853.53
Fixed Assets	
2200 _ CLUB EQUIPMENT	271.97
Total Fixed Assets	271.97
Other Assets	
1200 _ MARKETABLE SECURITIES	
1233 _ MERRILL LYNCH MONEY MARKET ACCT	53,732.07
1232 _ MERRILL LYNCH MONEY MARKET	86,688.46
1255 _ FIDELITY ASSET MGMT MF	48,195.45
1231 _ ALGER SMALL CAP FUND	5,400.05
1230 _ ALGER MID CAP FUND	13,842.06
Total 1200 _ MARKETABLE SECURITIES	207,858.09
Total Other Assets	207,858.09
TOTAL ASSETS	300,983.59
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	
3032 _ OTB	4,100.00
Total Accounts Payable	4,100.00
Other Current Liabilities	
3030C _ DUES PD. IN ADVANCE	12,450.00
Total Other Current Liabilities	12,450.00
Total Current Liabilities	16,550.00
Total Liabilities	16,550.00
Equity	
3800 _ RESERVES FOR AWARDS	5,990.10
3900 _ NET ASSETS	283,126.37
Net Income	-4,682.88
Total Equity 284,433.59	
TOTAL LIABILITIES & EQUITY	300,983.59

March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TX. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd., Hilton, NY 14468. The following are available:

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WW I military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and 1BCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

SUMMARY OF MINUTES: ANTIQUE WIRELESS ASSOCIATION, INC.

Membership Meeting, November 10, 2002

Meeting called to order by President Fizette at 11:07 a.m. Joyce Peckham gave secretary report of Nov. 2001 meeting. Bill Fizette gave report on informal membership meeting at the annual conference.

Ron Frisbie gave nominating committee report and the results of the election of board mem-

bers. 644 valid proxies were received, which constituted a quorum of the 3472 members of record. Three votes were cast at the meeting.

Item 1 of the proxy, which included a proposal to set at 18 the number of directors of The Antique Wireless Association, Inc. was passed with a vote of For 635, Against 4, Abstain 8.

Item 2 of the proxy proposed that the following nominees be directors of The Antique Wireless Association,Inc: Brian Belanger (new addition to the board), Tom Peterson, William Fizette, Bruce Roloson, Randolph Haus, Lauren Peckham. It was passed with a vote of For 629, Against 2, Abstain 16.

Item 3 of the proxy applied only to The A.W.A. Electronic Communications Museum and was not discussed here.

Meeting was adjourned at 11:13 a.m.

Board of Directors Meeting, November 10, 2002

Meeting called to order by President Fizette at 11:14 a.m. President Fizette reads his resignation letter which takes affect at the close of the board meeting. The board of directors accepts his resignation. Ron Frisbie names the slate of officers for the next year:

President: Geoffrey Bourne for one year until 2003.

1st VP: Brian Belanger for one year until 2003.

Nominations are accepted by the board and passed unanimously. Joyce Peckham gives secretaries report of May 2002 meeting. Board accepts and passes. Randy Haus gives Treasures report. Board accepts and passes. Bill Fizette gives President's report. Board accepts report.

Old Business

Membership Report by Joyce Peckham: US members 3214, down 113 from last year; Canada members 142, down 11; Foreign members 115 down 10. Total membership 3472, down 134; Life members 37. Board accepts report.

Joyce gives a report on the credit card situation. We still accept Visa and Mastercard but no longer accept Discover and American Express. No one was using those cards and their fees were too high. Board accepts report.

A report of the 2002 conference was given by Hugh Davey, Lauren Peckham, Bruce Roloson and Randy Haus. The conference went off with little or no problems and was a success.

Marc Ellis gave a report on *The OTB*. All was going fine. He was commended on the fine job that he and his crew are doing.

Bill Fizette read a report from Tom Perera about the *AWA Review* Volume 15.

Tom stated that he had good success in finding authors and material but also stated that he did not realize how much time it takes to put one of the *Reviews* together.

Bill Fizette and Marc Ellis gave a briefing on the AWA 50th anniversary book

A proof copy was made available to the board for their approval. The final should be out by the first of the year.

AWA chapters were discussed at great length. Ron Frisbie stated in his report that there was much interest in becoming AWA chapters but none have come to be, except for the CC-AWA in Charlotte.

Chris Fandt and Ed Gable reported on regional meets associated with the AWA. There was the AWA/VRPS in Houston, AWA/IHRS in Indiana and others.

Marc Ellis reported, for Chuck Schwark on the AWA internet site. The site is doing quite well. The AWA has gotten a significant number of new members from the site, which averages over 60 hits and over 18 Mg of data transfer each day.

Other items were discussed pertaining to the daily operation of the AWA.

New Business

Budget 2003: Randy Haus gave the financials for the next year.

The Board accepted and passed the budget.

Conference 2003: Hugh Davey, Lauren Peckham and Bruce Roloson gave report on next year's meet. The theme will be Frequency Modulation. Seminars are being lined up and the contest is in order. The RIT Inn will be the site for the next conference. All was in order and on track.

AWA Review Volume 16: Bill Fizette gave a report for Tom Perera. Tom states that he has a number of articles for the next *Review*. The board decided to put the next *Review* on hold until the next board meeting in May 2003 so we could get some new proposals on the printing of the review. Need to get the cost of the review down so it can be sold for about $20.00 to increase sales. Item tabled till next meeting.

Other small items were discussed.Meeting was adjourned at 3:30 p.m.

Summaries by Geoffrey Bourne,
President, AWA

MUSEUM NEWS

Visit us on the Internet at http://www.antiquewireless.org

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (585) 392-3088, e-mail: k2mp@eznet.net.

The A.W.A. Electronic Communication Museum is an IRS 501(c)3 charitable organization.

From the Curator

Hello and a belated happy new year from your museum crew and myself. The end of the year was busy as many donations were processed through the system (see the separate donation list).

I am very happy to report that the very interesting Selectosphere receiver (*OTB* 32-3), previously on loan from the John Luke Kelly collection, has been given to the permanent museum collection by Susann Miller. We are also especially pleased to have the AMRAD IP-501 variant and AMRAD 2575 Crystal set as well as the two Kenwood items representing that company's earliest breakthrough into the Ham SSB transceiver market. The MIL radio enthusiast will be interested in the Harris AN/URC-106—a splendid example of a next generation all solid state, multi-mode, 100 watt class, HF transceiver.

I'd like to recognize and thank Joe Schroeder, W9JUV, our *OTB* Copy Editor, for his work in brokering the AMRAD units. Similarly, thanks to AWA member Jerry Vanicek for his efforts in bringing the Selectosphere donation to fruition.

Not all donations are hardware and artifacts. Your museum also received several nice glass display cabinets and the donation of lumber for shelving. Please take note of the most generous cash donations as well. Such donations can be earmarked for special purposes if you wish. Contact me or the Museum Director for gifting opportunities.

In the last issue we announced the formation of an acquisition program with funding set aside to acquire specific pre-approved artifacts should they become available. Just weeks later an opportunity did arise to acquire a highly desirable Collins KWM-1 transceiver with matching power supply. This is a historically significant item as it is the first SSB transceiver design of the modern era and deserves a place in any communication museum. Another announcement in our last column was the bid sale for two excess items from the museum collection; receivers by National and McMurdo-Silver. The successful bidder for the McMurdo was AWA member Frank Rasada. There were no bids on the National.

Congratulations to museum Treasurer Lt. Stan Avery, WM3D, on his retirement after 34 years with the Brighton, NY Police Department. Stanley is not only a most competent Treasurer, but is also the chap who handles all of the museum store mail order sales. Anyone who has received a museum order has probably marveled at the appearance of their address handwritten in Stan's glorious calligraphy. It is worth sending us an order just for that alone. Do see the museum store order page for the latest *AWA Review* 15 and other offerings.

It should also be noted that Bob Perry, W2TIX, your museum Registrar, had a difficult time after recent heart by-pass surgery. We're pleased to know that Bob is doing better day by day.

The museum was cited in two publications recently. One was the excellent publication that comes with membership to the well-respected Radio Club of America. In a recent issue, the cover article was on OKI Electronics and their leadership role in Cellphone development. Highlighted and pictured was s/n 1 of the first OKI

cellular phone—now in the AWA Museum. The other article, with photo display, was in *Country Discoveries* magazine, a national publication describing country travel opportunities and destinations.

We had a small, but startling, explosion at the annex the other day when Ron, WA2TT, keyed up the Millen transmitter. After the smoke cleared and Bob, N2RSM ducked the shrapnel that flew 15 feet away, we determined one of the big 'ole 851 modulators had shorted. We had two spares. One spewed brown smoke inside when lit off (don't you hate that!); the other is now installed and functional, but only draws half the current of the other when we really pour the juice to it. So, we need a good 851. Any out there for offer or trade?

Speaking of offers, so many of you were kind enough to comment on the omission of my separate communications equipment auction at the conference last Fall. I chatted with the AWA conference folks and it is pretty firm that there will be an activity focused just on the auction of communications equipment. Watch for that announcement and thanks again for all of your kind words.

Now, to a closer event. Don't forget to plan for the AWA Spring Meet at the Museum Annex, May 3, 2003. "Dawn 'til gone" is this years motto with more events to keep you occupied every minute. Sure, there is the flea market, open and advertised to non-AWA folks; sure, there is an auction of the better annex "stuff" replacing the ill fated LeMans start of last year's tag sale; sure, there is a tag sale all day; sure, there will be refreshments available all day onsite; sure, the annex and museum will be open and much more. You'll see operating displays demonstrating how to cut high quality vinyl records and what an operational 40 line scanning disc system looks like. There'll be an a.m. gathering with W2AN's Millen rig on the air, and more. And, it is still all FREE.

You may be interested to know that a large building, right across the road from the Annex, came on the market recently. Morgan Wesson and I eagerly took a look and found it to be an ideal museum site with lots of display space, a space for meetings and educational gatherings and even an apartment (Curator quarters, of course !!) The problem is that the $.5 Million asking price was too high as it is the business that is for sale, not just the building. Nonetheless, a two pronged investigation continues into the feasibility of acquiring a new site or of building on our currently owned property.

Allan Pelllnat's "Adopt-A-Radio" program was initiated at the 2001 Conference in connection with the museum and annex open house. At that time six home entertainment receivers were selected and placed on display in the annex. Three were adopted as follows:

A RCA Radiola 20 by James F. Crews, a King Model 30 by Robert MacIntyre, a Bremer Tully Counterphase Six by Allan Pellnat.

Under the terms of adoption, each person was allowed one year to complete restoration and was to

RECENT MUSEUM DONORS

(COMPILED DECEMBER 30, 2002)

❖ Sam Cali	*400 tubes, B&K TV Analyst*
❖ Ed Gable, K2MP	*Ferris Instruments (Early Boonton) Sig Gen*
❖ Jay Whipple	*Scanning Disc TV Camera + Televisor, working*
❖ Julian Merson	*Melody Cruiser boat style transistor*
❖ Ed Gable, K2MP	*Harris RF-2301A (AN/URC-106) 100W SSB Xcvr, Regency HR2B transceiver*
❖ Lawrence Briggs, W3MSN	*Astron 35M, Meters, more...*
❖ Frank Corman	*Kenwood TS-820S, Drake R4B w/VHF converters, Azden PCS 2800, Brimstone 144, more...*
❖ Tom Rosica, W2GIR	*2 nice home brew RX of 201A era, ATV TX.*
❖ William Kelly	*Cable converters, telephone items, NuTone radio NIB*
❖ John Doviak	*HP120B oscilloscope, good operating condition*
❖ Leo Slocum	*Nice Kodel model C w/199 det.*
❖ Duane Redline,	*Hallicrafters SR-42, Hallicrafters HA-26, Echophone Commercial, more....*
❖ Bob Roberts, WA2QAU	*Kenwood TS-520 w/CW Filter*
❖ Edson Snow, W2UN	*Meissner AM Crystal Tuner, home brew CW paddle*
❖ Stan Avery, WM3D	*Motorola Cellphone system, MicroTAC/Piper*
❖ Ken Zeiner	*Early commercial grade Code-a-Phone, as new*
❖ Mike Schneier	*High end reel to reel by Grundig and Concertone*
❖ Susann Miller (John Kelly)	*Selectosphere receiver and speaker (OTB 32-3)*
❖ Richard Cox (Family)	*AMRAD IP-501 variant, AMRAD 2575 Xtal set, Jenkins-Adair RX long wave coil.*
❖ Blue Ribbon Households	*Display cases*
❖ Dave Parsons, N2ATY	*Ten-Tec IV, HB p-p 813 PA, VTVM, Cantenna, more...*
❖ Mike Datzell	*Early, small B&W Sears TV*

And thanks to the following generous members and supporting organizations:

❖ Thomas F. Peterson, Jr.	*Cash Donation - Acquisition and Building Funds*
❖ DuTreil, Lundin & Rackly	*Cash Donation - General Fund*
❖ Frank M. Rasada	*Cash Donation - Acquisition and Building Funds*
❖ Robert Schaumleffel	*Cash Donation - Acquisition Fund*

return it at the following year's conference. All three receivers were returned completely restored to museum presentation quality cosmetically. The RCA and King were restored to full electrical functionality.

At the 2002 conference the returned restored receivers were displayed along with nine additional candidates for adoption. Six of them were were adopted as follows: Majestic Model 49-B and Silvertone Model 5566? Fred J. Crews, Michigan Radio Corp. 1 Tube Regen and Akradyne 3-dial TRF by Robert MacIntyre, National SW-54 Communications Receiver by Allan Pellnat, RCA Audio Amplifier, Model SVP10,by Mani Pires.

Finally, most of the phone numbers in Rochester's old 716 area code now have the area code 585. Thus the number for the museum Curator and administrative office is now (585) 392-3088.

From your museum crew, S'long for now and Cheers!

Ed Gable

Ed Gable, K2MP/W2AN
Museum Curator

SUMMARY OF MINUTES: A.W.A. ELECTRONIC COMMUNICATION MUSEUM

Membership Meeting, November 10, 2002

Meeting called to order by Director Peterson with all museum Officers and Trustees in attendance. There was one member present. Proxy committee chairman Ron Frisbie reported 644 valid proxies were received and thus Director Peterson declared a quorum to exist against 3,472 members of record.

Ron Frisbie reported on Proxy item #1, which included a proposal to set the number of museum trustees to 12, as 637 votes FOR, 2 AGAINST and 5 ABSTAIN. Moved to accept and seconded, passed.

Proxy Item 2 applied only to AWA, Inc. and was not discussed here.

Ron Frisbie reported on Proxy item #3, the election of those named persons on the Proxy to terms specified, as 626 votes FOR, 1 AGAINST and 17 ABSTAIN. Moved to accept and seconded, passed. (The list of Museum Officers and Trustees is shown at the head of this column.)

Director Peterson referred members to detailed reports to be given in the following Trustee's Meeting. He then called for additional business, and there being none, William Hopkins moved to adjourn, seconded by Ronal Roach, approved.

Board of Directors Meeting, November 10, 2002

Meeting called to order by Director Peterson with all Officers and Trustees in attendance. Secretary Gable referred to the published meeting minutes of the May, 2002, meeting. There being no additions or corrections it was moved to accept, passed.

Ron Frisbie, as Chairman of the nominating committee, presented the slate of officers for one year term for 2002/2003. Vote called, unanimously approved.

Treasurer Stan Avery presented the finance report as prepared by the Heveron and Heveron accounting firm. Discussions followed including topics of; AWAECM fiscal year and meeting dates allow little time to analyze the report; report still carries too much asset value for back issues of *AWA Reviews*; several fixed assets are incorrectly shown. Stan Avery reported he will work with H&H to improve and correct the charts of account and Director Peterson will work the *AWA Review* asset issue.

Director Peterson reviewed the AWA, Inc. board meeting discussion regarding the funding of *AWA Review* sales, a traditional means of supporting the AWAECM. It was reported that the cost to print *Reviews* is becoming too high for an annual issue and is likely that they will only publish once every two years. This could reduce income to the museum by $6,000 per year. After further discussion there was no action except to follow the plans of the AWA, Inc. and to be proactive.

Director Peterson called for a discussion of the Al Jones tube collection offer. Points of discussion centered on; no current room for this large collection, donor wishes the majority of the collection to be shown, accepting would turn the AWAECM into a facility heavily focused on vacuum tubes which is not our current charter, several AWA/AJ duplicates could be sold with funds going to display area facilities, would need a dedicated tube expert to administer. It was determined that despite some problems, it would be a positive move for the AWAECM and that we should keep the dialog open and work issues. Tom Peterson is actionee.

Deputy Director Allan Pellnat reported on the Adopt a Radio program where AWA artifacts are presented to members with known skills for restoration. He reported that all artifacts loaned out have been returned with excellent results. Tom Pe-

(continued on page 19)

A.W.A. ELECTRONIC COMMUNICATION MUSEUM
PROFIT AND LOSS
November, 2001 through October, 2002

Ordinary Income/Expense	
Income	
6000M _ DONATIONS FROM CLUB	16,941.00
6007M _ MISCELLANEOUS INCOME - MUSEUM	800.00
6010M _ MUSEUM STORE INCOME	831.31
6020M _ INT ON BANK ACCOUNTS - MUSEUM	14,737.24
6024M _ AWA PUBLICATION INDEXES	187.50
6025M _ DISPLAY ADS IN OTB - MUSEUM	780.00
6027M _ DIVIDENDS - MUSEUM	5,417.46
6030M _ AUCTION PROCEEDS	1,578.43
6031M _ DEACCESSIONS - SALES	128.61
6036M _ CONTRIBUTIONS - MUSEUM	2,425.60
6038M _ SURPLUS SALES , GENERAL	1,412.70
6039M _ SPRING MEET INCOME	63.00
6040M _ CONFERENCE FLEA MARKET SALES	567.00
6041M _ OLD CONF. OTB/REVIEW BK SALES	1,276.90
6802M _ OLD OTB & REVIEW SALES	7,678.08
6806M _ CD ROM PROJECT	3,634.01
Total Income	58,458.84
Gross Profit	58,458.84
Expense	
8014M _ COMPUTER SUPPLIES - MUSEUM	227.99
8022M _ DEPR. ON ANNEX	3,414.74
8025M _ MUSEUM SUPPLIES	633.91
8027M _ MUSEUM RENT	1,000.00
8028M _ MUSEUM STORE EXPENSES	867.54
8030M _ INSURANCE-FINE ARTS COLLECTION	3,514.42
8031M _ INSURANCE - FIRE,THEFT-MUS,ANN.	1,017.29
8032M _ DEPR. ON COMPUTER	528.38
8033M _ INSURANCE - OFF. & DIR. LIAB	504.00
8036M _ OTB/REVIEW COST OF SALES	42.52
8060M _ GENERAL POSTAGE	307.85
8061M _ GROUNDS KEEPING	314.00
8062M _ GAS	967.28
8063M _ ELECTRICITY	1,454.79
8064M _ WASTE WATER SERVICE	100.00
8065M _ OFFICE SUPPLIES	450.45
8067M _ ACCOUNTING	821.00
8069M _ BUILDING MAINTENANCE	25.00
8072M _ ARTIFACT PURCHASE FUND	85.00
8073M _ LIBRARY BOOKS	97.39
8074M _ LOCAL CONTRIBUTIONS BY MUSEUM	50.00
8075M _ ALARM SYSTEM	102.00
8090M _ SPRING MEET EXPENSES	150.00
8115M _ ADVERTISING AND PHOTOGRAPHY	392.58
8116M _ LEGAL FEES	73.50
8130M _ VOLUNTEER APPRECIATION	600.88
8155M _ WATER	56.00
8160M _ TELEPHONE	1,016.78
8167M _ OTB & REVIEW SALE SUPPLIES	201.89
8168M _ OTB & REVIEW SALE POSTAGE	619.77
Total Expense	19,636.95
Net Ordinary Income	38,821.89
Net Income	38,821.89

A.W.A. ELECTRONIC COMMUNICATION MUSEUM
BALANCE SHEET
As of October 31, 2002

ASSETS	
Current Assets	
Checking/Savings	
1080 _ HSBC CKING - MUSEUM	39,626.64
Total Checking/Savings	39,626.64
Other Current Assets	
Certificates of Deposit	
1115M _ FLEET 24 MONTH CD	15,933.92
1057M _ CITIBANK 36 MONTH CD	34,829.75
1111M _ ESL 36 MONTH CD	77,402.86
1104M _ ESL MONEYMAKER ACCT.	77,038.29
1042 _ ESL MONEY MARKET - MUSEUM	7,209.08
1043 _ ESL MONEY MARKET RESTR.-MUSEUM	3,971.09
1108 _ ESL - 30 MO. CERT.- MUSEUM	25,115.13
Total Certificates of Deposit	241,500.12
1400 _ PREPAID EXPENSES	
1406 _ PREPAID RENT	166.67
Total 1400 _ PREPAID EXPENSES	166.67
1600 _ INVENTORY	
1623 _ AWA REVIEW 15	16,941.00
1622 _ AWA REVIEW 14	10,970.43
1621 _ AWA REVIEW 13	4,934.43
1618 _ AWA REVIEW 10	2,265.75
1616 _ AWA REVIEW 8	596.00
1615 _ AWA REVIEW 7	71 i.00
1614 _ AWA REVIEW 6	562.00
Total 1600 _ INVENTORY	36,980.61
1330M _ BANK ACCT. INTEREST	2,363.57
Total Other Current Assets	281,010.97
Total Current Assets	320,637.61
Fixed Assets	
2400 _ LEASEHOLD IMPROVEMENTS	5,386.38
2405 _ STORAGE BUILDING	88,549.02
2450 _ DEPR. RES ON STORAGE BUILDING	-40,738.64
2499 _ DEPR. ON ELECTRONIC COMM. MUSEU	-5,386.38
2500 _ LAND - LEGION PROPERTY	16,562.89
2510 _ COMPUTER EQUIPMENT	2,641.98
2545 _ DEPR. RES. ON COMPUTER EQUIPMEN	-2,113.12
Total Fixed Assets	64,902.13
TOTAL ASSETS	385,539.74
LIABILITIES & EQUITY	
Equity	
3900 _ NET ASSETS	346,717.85
Net Income	38,821.89
Total Equity	385,539.74
TOTAL LIABILITIES & EQUITY	385,539.74

MUSEUM NEWS, continued from page 17

terson reported on the on-going insurance upgrade project which was greatly successful with costs going from $5500 to $2400 per year with increased coverage.

Curator Ed Gable reported on the progress of the formation of an artifact procurement fund. Basically this is a pre-approved list of items desired for the collection and an available fund of monies specific for this application. The announcement will be in the November *OTB* and a formal operating procedure adopted this term.

Curator Gable also presented his annual operating budget showing good performance with income exceeding expenses. Discussion included the dividend income being much higher than normal due to several investments maturing simultaneously and that this far exceeds the norm. Because of the previously disclosed possible loss of *AWA Review* sale input, that line item needs to be reduced, and there is no line item input for the announced Procurement fund. Ed Gable is actionee.

The Curator reported that he has been in communication with the NYS Chartering Office and that our application is progressing normally.

Director Peterson discussed the progress of the new building/land procurement activity and said that no suitable parcels have been found to date. Ed Gable reported that he has hired a local surveyor to perform perc testing at the annex site as a first step in determining possible expansion on our currently owned property.

There being no further business, moved to adjourn, approved.

Edward M. Gable, Secretary

SILENT KEYS

We record the passing of the following AWA members with deep regret.

ROBERT J. ADAMS, (7-5-02)

WILLIAM J. BYRON, 79, W7DHD, performed engineering research and development in reactor safety instrumentation and control design. For twenty years he was also involved in reactor-plant startups on four continents. Byron was associated with Princeton Plasma Physics Laboratory's Tokamak Fusion Test Reactor Project for five years prior to retirement. His article, The Arc Method of Producing Continuous Waves, was published in *The AWA Review* (R-7-119).

STEVE CONKLIN, 49, (12-06-02) was an avid radio historian and a member of AWA for more than 20 years. In the early 1980s, he was instrumental in revitalizing the Greater New York Vintage Wireless Association, helping to turn it into the premier group for New York and Long Island area antique radio collectors. For a number of years, he operated "The TV Works" television repair shop in East Hampton, NY.

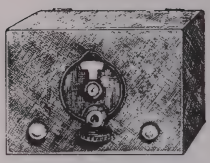
JOHN C. GROFF of North Canton, OH.

DR. GERALD E. "DOC" McCARTHY, AA2CQ, 82, (11-8-02). A veterinarian, he was first licensed as W8OMK in 1934. He served with the rank of lieutenant as a radio/radar operator in the U.S. Army Air Corps during WWII (1941 to 1945).

ORVILLE L. POTTER, WD4HIQ, 89, (9-23-02) was Manager of Aerial Reconnaissance and Mapping Markets for Eastman Kodak. He worked with many government agencies to solve their photographic problems. At NASA, he helped develop special photographic emulsions that were used in the Apollo series and later in the Earth Resources Technical Satellite Systems. Potter worked for Kodak from 1937 until retirement in 1974.

GROTE REBER (12-20-02) in Tasmania. See Joyce Peckham's remembrance in the "Letters" column.

Note: AWA officers and members are being asked to submit all information about Silent Keys to Joyce Peckham, Box E, Breesport, NY 14816. This will help in the collection and coordination of information and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.



1929 QSO Party Results

By John F. Rollins, W1FPZ

The Bruce Kelley Memorial 1929 QSO Party was held during the last weekend in November and the following weekend in December. There were 59 logs returned by the reporting deadline. Another 10 or 15 members were known to have been on but did not send in logs.

Conditions seemed to be very good across the country. A number of hams reported fine conditions with good propagation and no QRM—remarkable! There were more East-West contacts made this time, and our members from districts Nine and Zero seemed to have a great time working east or west or south with relative ease.

Three of our Canadian members were hammering in great style: David, VE3BBN, with his Hartley had one of the cleanest signals going and a great score of 65 contacts—eclipsed only by Bob, W2ZM with 66 contacts. In general the average individual log tally of our members was higher than in recent years, attesting to the good propagation conditions.

More of our participants were using early period receivers: one and two tube regenerative receivers of the 1920s. Early 1930s National receivers: SW-3 and FB-7 were in use as well. We also had a few new participants to the Party. Welcome!

As always I received some spectacular photographs of early equipment replicas built by our members. We certainly have some meticulous craftsmen in our midst. Thanks to all and I hope to see you on the upcoming Linc Cundall Old Time Contest.

Best 73s,
John F. Rollins, W1FPZ 1929

THE TOP TEN SCORES

Call	Contacts	Call	Contacts
W2ZM	66	VE3CUI	46
VE3BBM	65	N9AHQ	46
WA3FFC	64	W2IRS	44
W1YG	57	K4LJH	42
KJ8L	55	KB0ROB	36

COMPLETE PARTICIPANT LIST

	Call	Transmitter	Power	QSOs
W1	W1TSP	29 Hartley	10	23
	W1YG	29 Hartley	9	57
	NV1X	29 TPTG	9	4
	NX1B	29 Hartley	8	5
	W1NV	29 Hartley	10	23
	KC1FB	28 MOPA	2	8
	W1DDW	29 Hartley	10	27
	NE1S	29 TNT	9	31
	K1TMJ	29 Hartley	10	19
	W1GIG	29 TPTG	9	14
	W1FPZ	29 COLPITTS	10	18
W2	W2IRS	29 Hartley	10	44
	W2ER	29 MOPA	10	15
	N2TWW	27 TPTG	7	15
	KE2O	29 TNT	5	22
	W2HBE	29 Hartley	8	16
	K2LP	29 TPTG	1	24
	N2VO	29 TPTG	8	44
	W2TM	29 MOPA	10	12
	W2ZM	29 HARTLEY	10	66
	W2AN	29 PPTPTG	10	20
	N2YR	29 Hartley	10	6
	K2KK	29 Hartley	4	14
	WA2NPL	28 PPTPTG	10	20
	W2DGB	29 TPTG	9	8
W3	W5WS/3	28 MOPA	10	31
	KD3OR	29 Hartley	10	7
	W3FJJ	29 Hartley	9	12
	WA3FFC	28 MOPA	10	64
W4	K4KRE	29 Hartley	10	6
	AA4RM	29 PP Hartley	9	16
	K4JYS	29 TNT	1.75	13
	W4VBX	29 TNT	9	10
	K4LJH	29 Hartley	10	42
	WA4IAM/N4AWA:	29 TNT	8	17
W5	AC5AM	29 Hartley	10	31

	Call	Transmitter	Power	QSOs
W6	W6DJX	29 TNT	10	21
	K6TQ	29 TNT	10	16
	W6TOP	29 Hartley	10	4
W7	K7LNG	25 Hartley	8	14
	W7LOG	29 TNT	8	3
	W7DRA	29 PP	10	3
W8	WD8OFB	29 Hartley	5	1
	K8JWR	29 MOPA	10	21
	NI8G	29 TPTG	10	14
	W8KGI	29 Hartley	10	8
	KJ8L	25 TPTG	10	55
	W8ZNX	29 TNT	10	23

	Call	Transmitter	Power	QSOs
W8	KC8DDH	29 Hartley	10	3
W9	N9CQX	29 TNT	8	12
	N9AHQ	29 MOPA	8	46
	A9DH	29 TNT	10	26
W0	KB0ROB	29 Hartley	10	36
	AB0CW	29 Hartley	10	8
	W0OG	29 TNT	10	22
	W0NYQ	29 TNT	9	10
VE	VE3RSA	29 Hartley	8	28
	VE3BBN	29 Hartley	10	65
	VE3CUI	29 MOPA	10	46

The 2003 Linc Cundall Memorial OT DX Contest

By Randy Haus, KB2PLW

A Memorial to Linc Cundall W2LC

The annual OT DX Contest will take place in April, 2003. This contest, held on 40 and 20 meters gives the West Coast and DX Old Time operators a more favorable chance to participate and accords higher point earning status to the great rigs and circuits of the 1950s and earlier. In checking the contest listings maintained by the ARRL, I found that, the entire month of April is clear of major U.S. contests, so let's keep our fingers crossed regarding the dates below.

The 2002 OT DX contest was a great success, with thirty-six participants and an Illinois operator, Harry Blesy, N9CQX taking 1st prize. Again, equipment or circuits designed before January 1st, 1960 will be counted as OT gear in scoring. You will notice that the twenty meter contest window has been narrowed by five kHz. That should make it a little easier for us to find each other on twenty meters and the area between 14070 and 14075 is usually occupied by radioteletype stations anyway.

Logs will be sent out to regular AWA contest participants during the third week of March, 2003. As always, there may be some omissions so if you are a regular participant and don't receive an OT DX Contest Log by March 24th, 2003—or if you are a first-time participant—please write to Randy Haus KB2PLW, P.O. Box 665, 303 Pennsylvania Avenue, Trumansburg, NY 14886.

• *Dates and Times*: 2300UTC Wednesday to 2300UTC Thursday (April 9-10) and 2300UTC Saturday to 2300UTC Sunday (April 12 - 13), 2003.

• *Objective*: Contact the greatest number of AWA members. When calling, use "AWA AWA AWA de KB2PLW" as an example. Once contact is made, exchange RST, name and year of equipment such as "TX 55 for a 1955 transmitter and "RX 38" for a 1938 receiver. Send "MOD" for 1960 or later gear.

• *Rules*: A station will be scored only once on each band. Non-member contacts and stations not submitting logs will not count.

• *Frequencies*: 7030 - 7050 kHz and 14050 - 14070 kHz, +/- QRM.

• *Scoring*: QSO Zones: "E" eastern zone, U.S. Districts 1, 2, 3, 4, 8, 9, plus VE1, VE2, VE3;

Beautiful old-time station by Paul Mooney, K4KRE. UX245 Hartley oscillator on shelf. Echophone Commercial receiver on operating table.

"W" western zone, U.S. Districts 5, 6, 7, 0 plus VE4, VE5, VE6 & VE7; "DX" zone, all others.

• *QSO points per contact by zone*: "E" to "E" or "W" to "W": 1 point; "E" to "W" or "W" to "E": 2 points; "E," "W," or "DX" to "DX": 3 points

• *Equipment Multipliers*: Mod TX and RX: 1 point; OT TX or RX: 2 points; OT TX and RX: 3 points

• *Power multipliers* (input to final): 0-4.9 watts: 4 points; 5-24.9 watts: 3 points; 25-100 watts: 2 points; 100 + watts: 1 point

• *Determining total points per QSO*: (1) Find the QSO points for the contact. (2) QSO points × your equipment multiplier × your power multiplier = total points for the contact.

•*Scoring examples*: **Example 1**: N9CQX contacts W1FPZ.

Both are in the "E" zone for 1 QSO point. Both have OT TX and RX for a 3 multiplier. Both are operating at 10 watts for a 3 multiplier. Each operator has $1 \times 3 \times 3 = 9$ points. **Example 2**: K6TQ contacts W2ER. "W" to "E" contact for 2 QSO points. K6TQ has OT TX and RX with 20 watts; W2ER has OT TX and MOD RX with 50 watts. K6TQ's points: $2 \times 3 \times 3 = 18$; W2ER's points: $2 \times 2 \times 2 = 8$

• *Awards*: Plaques will be given out at the AWA Conference in September.

• *Logs*: As stated above, log sheets will be sent out to previous OT contest participants and to first-time contest entrants who write me.

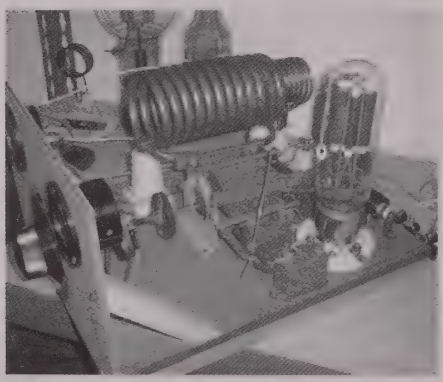
30s Night Revised Rules

By Randy Haus, KB2PLW

Our announcement of "30s Night" in the November issue of *The OTB* brought forth a lot of enthusiastic comments as well as a few requests for change received and relayed to me by John Rollins. We made most of these changes—including lengthening the operating time to 12 hours and adding 40- and 20-meter CW frequencies. Due to the experimental nature of the contest, I would still like to keep AM operation to 80 meters for this trial run.

The original rules are reprinted below with the revisions printed in boldface. But first, a few words about what constitutes an "OT" rig for this contest.

The reason *OTB* Editor Marc Ellis suggested and encouraged this contest was because of the dearth of 30s-style ham construction projects in our publication. By far the preponderance of projects have been in 20s style and using 20s tubes. Strong as the lure of the 20s might be, 30s projects have a look and fascination all their own. A recent (and rare) case in point is John Rollins' 30s VFO featured on the cover of the February issue.



Superb '29 Hartley with 211 tube, by Stan Hojnacki, WA2NPL.

Unlike our other contests, rigs earlier than the period of interest do not qualify as "OT," so leave your copper-tubing Hartley on the shelf! By 1930, we as amateurs had learned how to overcome chirps, yoops, growls and a host of other sounds that characterized the average rig of the late 1920s. Overall, the airwaves of the 1930s sounded cleaner. This was accomplished partly by wide spread crystal control or in the case of self-controlled transmitters, sophisticated building techniques and advanced power supply design.

Any circuit that was introduced in 1930s literature is eligible for the contest and it would be a plus (though not required) if your rig also used tubes that were introduced during the 1930s. However, earlier tubes are permissible. Manufactured commercial rigs, of course must have been released in the 1930s. And after you've built or restored your 30s rig, don't forget to submit a writeup to *The OTB*!

So let's try this and see how it goes. My personal philosophy is such that I would rather try something new and fall flat on my face than to never try anything new at all.

• *Dates and Times*: 2300UTC Thursday to **1100UTC** Friday (March 13th-14th, 2003). The **12 hour sprint** runs from 6 p.m. EST March 13th to 6 a.m. EST, March 14th, 2002.

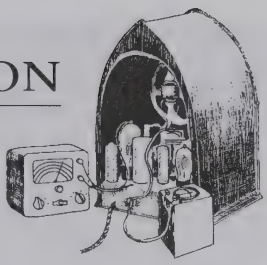
• *Objective*: Contact the greatest number of AWA members. When calling, use "AWA AWA

(continued on page 25)

EQUIPMENT RESTORATION

EDITED BY **KEN OWENS**, 478 SYCAMORE DR., CIRCLEVILLE, OH 43113
radiowd11@yahoo.com

PLEASE SEND CORRESPONDENCE DIRECTLY TO THE ABOVE ADDRESS, INCLUDING SASE FOR REPLY.



Solid-State Audio Transformer Replacements and Other Tips

In a recent column (*OTB* V.43,#3), I reprinted a 1982 circuit for replacing audio transformers with solid-state components. This circuit was limited to use with voltages not exceeding 45. In the last 20 years, however, transistors have come a long way. Cheap small-signal and power transistors with ratings as high as 400V are readily available. Transformer replacements now can be designed to operate directly on any voltage found in tube radios without the need for Zener diodes to limit transistor voltages.

I decided to revise the 1982 circuit to use 400V transistors. Small-signal devices were tried at first, but could not be driven very hard without distortion. Power transistors were found capable of furnishing large voltage outputs with negligible distortion. The TIP50 NPN transistor in a TO220 case was cheap and worked well. I devised 2 circuits: a single-ended solid-state transformer replacement and a push-pull replacement. These are described below.

The Single-Ended Solid-State Transformer

The circuit is shown in Fig.1, and the actual unit in Fig.2. It is small enough to fit into an Atwater Kent transformer can. RP is the plate load resistor for the preceding tube. It is typically 27kΩ to 68kΩ. You can experiment to find the optimum value for your set.

The voltage gain of an audio transformer is equal to the turns ratio between primary and secondary. Turns ratios of 1:3 and 1:5 are the most common although ratios as high as 1:9 were used. The gain of the transistor unit is established by the value of RE. Values for gains of 3 and 5 are shown on the diagram. Other gains can be obtained by experimenting with RE.

The homemade circuit board was provided with jumper connections at X and Y. If the B+1 and B+2 voltages are the same, install a jumper at X. If different B+ voltages are used, leave it out. Likewise, if the following grid is returned to B-, install a jumper at Y. If the grid returns to some other point, leave it out. The use of jumpers reduces the number of connections to a minimum of 4, while allowing flexibility.

Performance was tested at 22.5V and 250V on B+2 with an audio signal applied between PL and B-. Output between G and B- was measured and displayed on the 'scope. At 22.5V, gain = 5, 4.8V output could be produced with 1V input before distortion set in. With B+2 = 250V, the input could be driven to 10V with 48V output before distortion occurred. This unit draws 3 mA at 250V.

With such small coupling capacitors, one would expect poor low frequency response owing to the low input impedance. This is not the case. Response was essentially flat from 20 Hz to 10 kHz. Therefore, bulky electrolytic capacitors are not required, and the response covers the range of AM broadcasting nicely.

The Push-Pull Solid-State Transformer

Transformers with center-tapped secondaries for driving push-pull output stages can be the

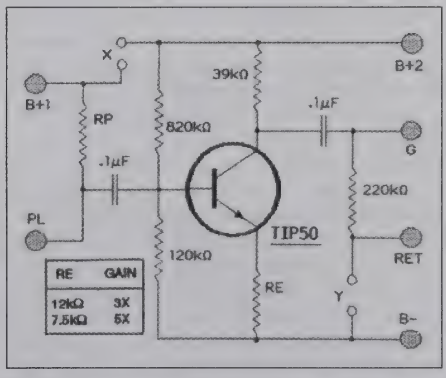


Fig. 1. Schematic of the single-ended solid-state audio transformer replacement. Table shows gain obtained with two different values of RE.

most difficult to replace. They range from 1:3 CT to 1:10 CT. The high ratio transformers were used to develop drive for triode output stages without using an intermediate driver stage, keeping down costs. While 1:3 transformers are readily available, they are not satisfactory replacements for 1:10 units. They don't develop enough driving voltage to give acceptable volume.

The single-ended unit was expanded by adding a second transistor as a split-load phase inverter. This inverter has unity gain from input to each grid or 2X grid-to-grid. Fig. 3 shows the circuit and Fig. 4 is the actual unit.

RP is the same as above. Values for RE for different gains are shown on the diagram. Other gains can be determined by experimenting with RE. Jumpers allow the same flexibility as with the single-ended unit.

Frequency response and output are the same as before except the output before distortion is ~45V grid to B- or 90V grid-to-grid with gain = 10X and B+2 = 250V. The unit draws 6 mA at 250V and will drive a pair of 45s to full output.

The transistors of both units were mounted on heat sinks. They are probably not necessary, but they were on hand. Both units get warm, but not hot, after several hours of operation at 250V.

If these units are installed in the original transformer cases, they should be wrapped in insulating material to avoid short circuiting to the cases.

♦ ♦ ♦ ♦

Ray Larson (W. Los Angeles, CA) sent the following items:

I have restored several BC-348 military receivers. They use paper capacitors molded in Bakelite cases for decoupling. They look like large mica capacitors, but are notorious for developing leakage and shorts. I locate bad ones with a test rig consisting of a transformer with a 120V primary and a 240V secondary feeding a bridge rectifier. The primary is connected to a Variac through a 100-150W lamp to limit the current.

The negative output of the bridge is connected to the chassis and the positive to the decoupling resistor. When the Variac is advanced, the decoupling resistor will get hot and begin to smoke if the capacitor is bad. I then replace both capacitor and resistor. This saves a lot of time for me.

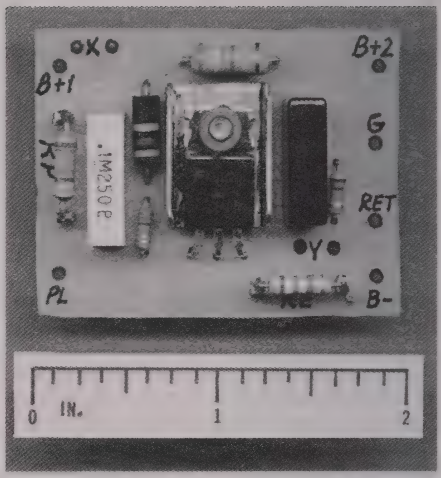


Fig. 2. The single-ended solid-state audio transformer as constructed. Jumpers at "X" and "Y" provide flexibility for use in different circuits (see text).

I have had trouble with fuses in the 5-15A range failing in a peculiar way. These are the 3AG (AGC) type using a ribbon element with a narrow section in the center. They show no continuity, but the ribbon looked intact on visual inspection.

I broke open several and found that the ribbon had cracked loose from the metal end cap. These fuses had all been used well within their ratings. I believe that expansion and contraction of the relatively stiff element eventually causes it to break loose from the end cap. I now use fuses with a crimped wire element and have had no further problems.

I have had problems with transistorized FM car radios. The radio would warble when the signal strength dipped as when driving behind

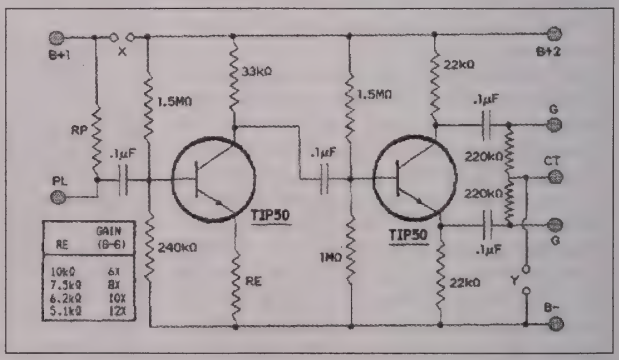


Fig. 3. Schematic of the push-pull solid-state transformer replacement.

buildings. The AFC would start hunting for stronger stations. I found that placing a parallel-connected pair of alkaline "D" cells in series with the 12V feed to the radio solved the problem. This increased the voltage to 13½, increased set gain, and stabilized operation.

While not strictly on the subject of radio, this tip may be useful. The contacts on my photo timer kept welding together. The timer energizes a Variac which controls enlarger lamp brightness. Investigation showed that the inrush current to the Variac was very high even when turned all the way down. The DC resistance of the Variac was only 1-2Ω, so the input current is large until the magnetic field builds up. Putting a 1-2Ω 10W wirewound resistor in series with the input to the Variac limited the inrush current and cured the contact problem.

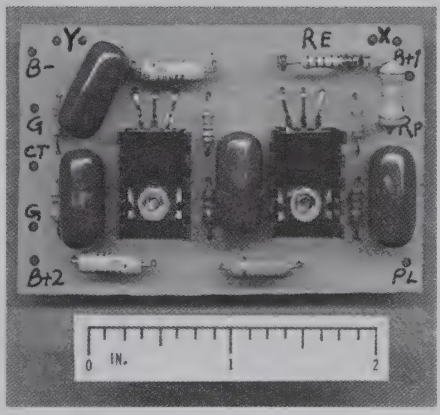


Fig. 4. The push-pull solid-state transformer replacement as constructed.

AMATEUR RADIO, *continued from page 22*

AWA de KB2PLW" as an example. Once contact is made, exchange RST, name and year of equipment such as "TX 35" for a 1935 transmitter and "RX 38" for a 1938 receiver. Send "MOD" for gear or circuits built or designed after December 31st, 1939.

• *Rules*: A station will be scored only once in each mode: Mode A, AM station to AM station, 2 points per contact for each operator; Mode B, AM station to CW station, 4 points per contact for each operator; Mode C, CW station to CW station, 2 points per contact for each operator.

Concentrate on Mode B (Cross mode contacts) from 0300 to 0400 UTC (10PM to 11PM) so that everybody will only have to retune their receivers once. **AM crossmode operators listen in the 3705 to 3725 band, CW crossmode operators listen in the 3875 to 3895 band.**

Non-member contacts and stations not submitting logs will not count.

• *Frequencies*: CW 3705 kHz to 3725 kHz, **CW 7030 kHz to 7050 kHz, CW 14050 kHz to 14070 kHz**, AM 3875 kHz to 3895 kHz +/- QRM

• *Scoring*: QSO Zones: "E" eastern zone, US Districts 1, 2, 3, 4, 8, 9, plus VE1, VE2, VE3; "W" western zone, U.S. Districts 5, 6, 7, 0 plus VE4, VE5, VE6 & VE7; "DX" zone, all others.

QSO points per contact by zone: "E" to "E" or "W" to "W": 1 point; "E" to "W" or "W"to "E": 2 points; "E," "W," or "DX" to "DX": 3 points

• *Equipment Multipliers*: Mod TX and RX (1940 or later), 1 point; OT TX or RX (1930-1939), 2 points; OT TX and RX (both 1930-1939), 3 points. Pre 1930s gear should be saved for the 1929 QSO party.

• *Power multipliers* (input to final): 0-4.9 watts, 4 points; 5-24.9 watts, 3 points; 25-100 watts, 2 points; 100 + watts, 1 point.

• *Determining total points per contact*: (1) Find the Mode points and QSO points for the contact and add them together. This total is the number of contact points. (2) Contact Points × your equipment multiplier × your power multiplier = total points for the exchange.

• *Scoring examples*: **Example 1**: W3VVS contacts W1FPZ on AM. Both are on AM for 2 Mode points. Both are in the "E" zone for 1 QSO point. 2 Mode points +1 QSO point = 3 Contact points. Both have OT TX and RX for a 3 multiplier. Both are operating at 10 watts for a 3 multiplier. 3 Contact points × 3 × 3 = 27 points for each operator. **Example 2**: K6TQ on AM contacts N4AWA on CW. 4 Mode points for each operator. "W" to "E" contact for 2 QSO points. 4 Mode points + 2 QSO points = 6 Contact points for both ops. K6TQ has OT TX and RX with 20 watts. N4AWA has OT TX and MOD RX with 50 watts.

K6TQ's points: 6pts × 3 × 3 = 36 points; N4AWA's points: 6pts × 2 × 2 = 24 points.

• *Awards*: Plaques will be given out at the AWA Conference in September.

• *Log Mailing*: Log sheets will be sent out to previous OT contest participants.

• *Log Returns*: Since results will be reported in the May, 2003 issue of *The OTB*, returned logs must be postmarked no later than April 1 in order the be counted. NO EXCEPTIONS! Send your logs to Marc Ellis, Antique Wireless Association, P.O. Box 1306, Evanston, IL 60204-1306.

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"MG" Tubes — Old and Not-So-Old

RCA introduced its then-revolutionary all-metal tube in 1935 [1], achieving a major tactical surprise over its competitors. They reacted in three ways: by taking out licenses to make metal tubes themselves, by converting their big-pin glass tubes to octal bases, or by going to the "MG" (metal-glass) format. Triad and Arcturus were particularly visible in the MG camp, claiming that they had devised the "perfected" metal tube and incidentally saving themselves most of the cost of new production machinery.

John Stokes' book [2] covers the MG line nicely. For illustration, Fig. 1 shows a Ken-Rad branded 6A8 after prying it open. The glass bulb inside is about the size of a regular 6A8GT. This particular used sample has "FADES OUT" scratched on the steel shell, and indeed tests weak on one section. It is not too hard to imagine removing the base from a 6A8GT and using it to "refill" the MG tube.

"MG" tubes came with a modest number of mid-'30s radios, notably Silvertones. A Silvertone Model 1946, if really restored to "original," will have its twelve octal tubes changed back to MGs!

The "MG" concept actually predates all-metal (octal) tubes. The Gold Seal Electrical Co. of Newark, NJ marketed a broad range of big-pin glass tubes inside aluminum shells. No advertising has been seen for them, and they are quite scarce today. Veteran collector Jim Cross recently got some Gold Seals new-in-box [3] and discovered a slip enclosed giving the whole product line. In addition to 13 two-digit types (01A through 80), there were four RMA-registered types: 2A5, 6C6, 6D6, and 25Z5. These would date the line to about 1933.

Gold Seal touted its tubes as having perfect electrostatic and electromagnetic shielding which added greatly to a radio's selectivity and volume. This hype may be discounted: the shell floats with respect to ground, and therefore can't be much of a shield! Fig. 2 shows a four-pin tube of this style, not identifiable as to type and carrying the distributor brand "Van Dyke," which

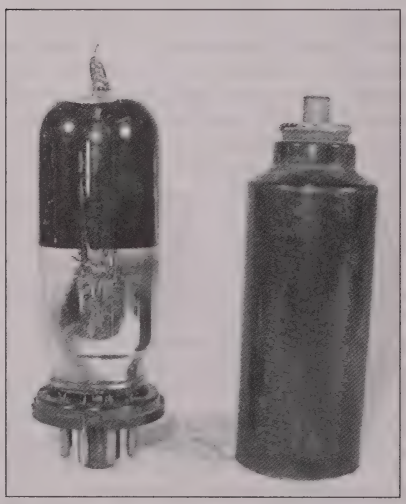

Fig. 1 - Ken-Rad 6A8MG

Fig. 2 - Van Dyke

Fig. 3 - Two 5Z4MGs

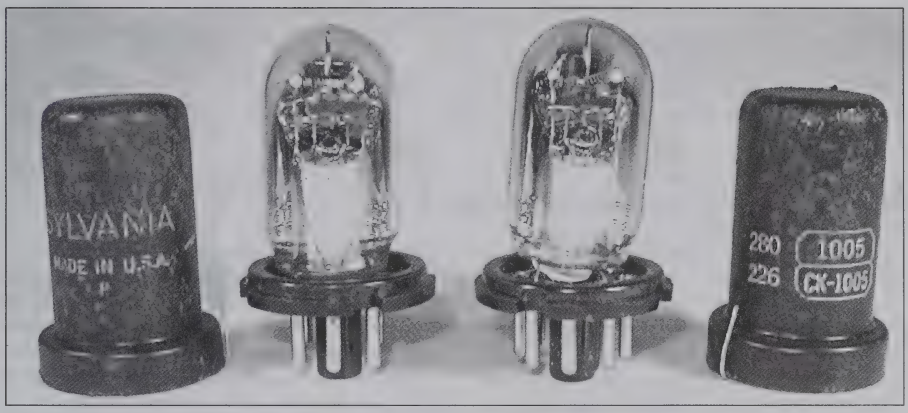

Fig. 4 - 0Z4 and CK1005

was probably made by Gold Seal.

Returning to the post-1935 "MG" tube, Fig. 3 shows two versions of the 5Z4 rectifier. RCA's original 5Z4 was in a tall perforated "birdcage" shell, with two individual external-anode diodes inside. The KenRad 5Z4MG at left looks identical to the RCA, but has a glass bulb inside. (This style has also been seen branded "Wards Airline.") The Arcturus "Coronet" 5Z4MG at right is more conventional in size.

The "MG" format generally disappeared toward the end of the '30s, but lived on in gas rectifiers. The reason seems clear: in an all-metal rectifier with grounded shell, one anode swings negative while its mate goes positive. The positive anode will ionize the gas, letting the negative anode conduct to the shell. So a glass insulating bulb is more or less unavoidable. Thus the 0Z4 introduced by Raytheon in 1935, and its '40s cousin the CK1005, included a small glass bulb—the same bulb found in the little glass 0Z4G. Fig. 4 shows a Sylvania-branded 0Z4 (possibly made by Raytheon) and a CK1005 as opened up.

By contrast, GE's 502 gas thyratron was expected to operate with its anode normally positive, and was built as an all-metal design.

RCA came close to making an MG tuning-eye tube. What came out commercially as the 6AF6G in 1938 had gone through five developmental models coded CA19 and CA19B through E [4]. The production 6AF6G is familiar to us as having a short glass bulb on an octal base, but the CA19B version would have had a metal shell with

(continued on page 30)

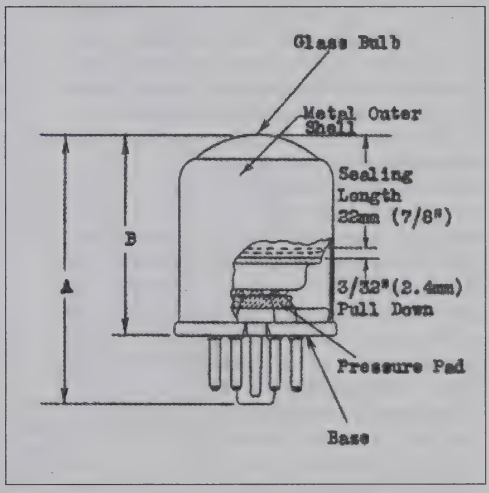

Fig. 5 - RCA CA19B developmental "eye"

Fig. 6 - RCA 12SK7C

EDITED BY **RICHARD A. PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
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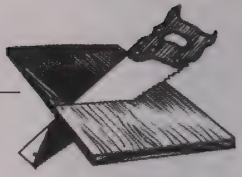


Bring Historical Circuits to Life On Your Workbench!

Build a Simple Oscilloscope – Part 3

Part 2 of this mini-series left us with a working sweep and a nice bright line on our 902 screen. Now it's time to finish this project by building the vertical amplifier and adding a couple of bells and whistles.

Since simplicity is high on our scale of priorities, we'll get by with a single amplifier tube—a high-gain pentode. Fortunately, we can design the amplifier and mount the CRT so as to make the trace move upward when the input voltage goes positive. This will keep us from having to operate the scope upside down. I chose a 6AU6, and it's hooked up as shown in Figure 1.

There are two BNC input connectors, with a 600 volt capacitor between them, allowing either an AC or DC signal to get to the grid of the 6AU6. The input signal goes to a potentiometer for a vertical gain control, and I took the circuit resistor values right out of the RCA tube manual as a starting point.

Since the sensitivity of the CRT is about 150 volts for a full two inches of deflection, I hoped for a gain of about 150 from the tube so that a one-volt sine wave could fill the screen. Another thing I had to do was to make sure the trace could be centered, and I wanted the amplifier to have good high-frequency response, because I hoped to be able to use the scope up toward a megahertz or so.

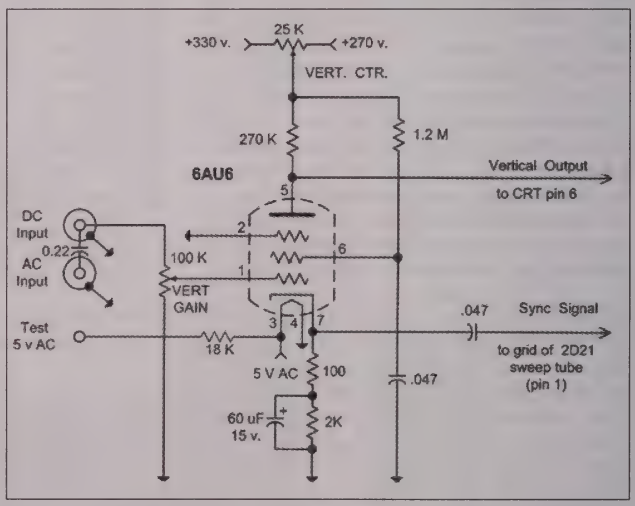


Fig. 1. Circuit of 6AU6 vertical amplifier.

When I built the circuit up, I was able to get a gain of just about 180 with the values from the tube manual. However, the high-frequency response was down by half at only 40 kHz. By dropping the plate load resistor to 270 K, the HF performance improved to nearly 100 kHz, while gain changed to 165.

One reason for the poor response at the high end is that the input potentiometer has a capacitance to ground of about 30 pF, so a high frequency input signal gets eaten up before it gets to the grid, and the effect depends on the setting of the pot! I toyed with the idea of using a chain of 6AK5s as a video amplifier, then gave up and changed the vertical gain pot from 2.5 megs to 100K. In this breadboard one must be content with only 500 kHz of "useful" bandwidth.

Take a look at the cathode of the 6AU6: total resistance to ground is 2100 ohms in two resistances, and 2000 ohms of that is heavily bypassed by a 60 uF capacitor. That gives the amplifier more AC gain above a few Hertz, while leaving a sample of the input signal at the cathode, the way a cathode follower would work.

This sample gets connected through a .05 uF cap to the sweep circuit, and serves a synchronizing function. As the "fine horizontal" control is rotated, a small positive-going change in voltage from the vertical amplifier cathode can kick the thyratron into conduction just a little earlier than usual, and with patience you can get the trace to hold still.

To center the sweep vertically, the amplifier takes its plate supply from a 25K pot connected between points in the power supply giving about

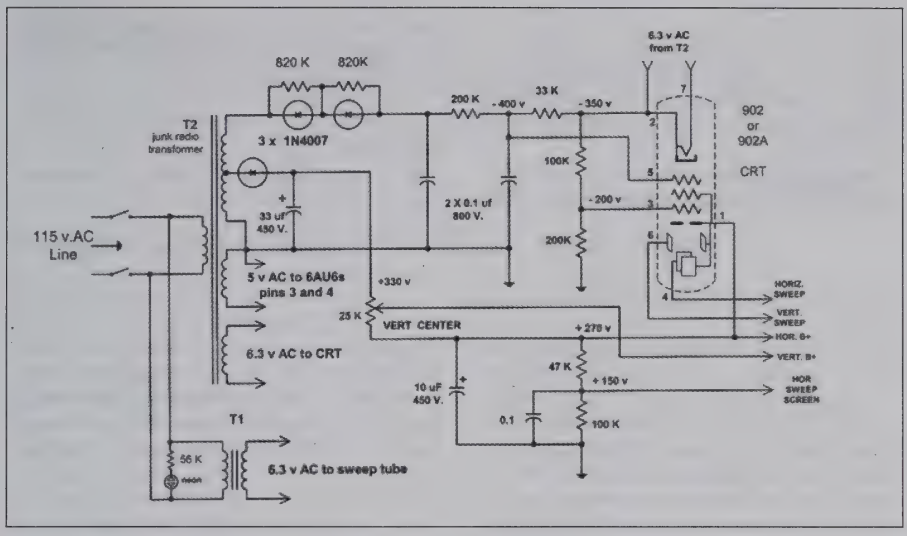


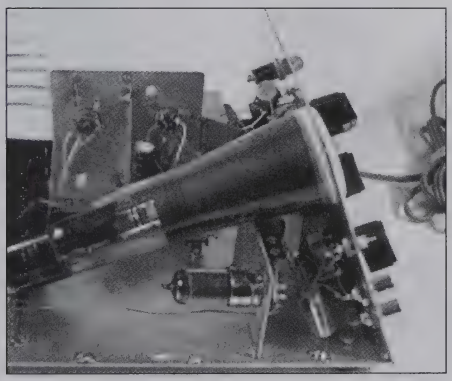
Fig. 2. Final power supply schematic.

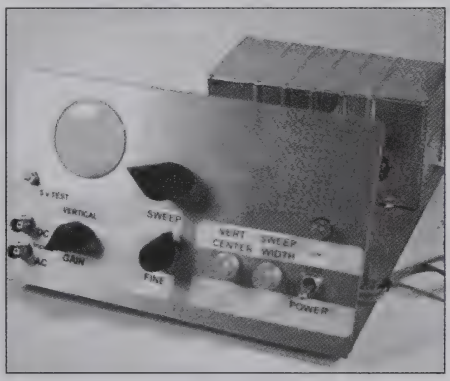
+330 to +260 volts. The pot replaces a 33K fixed resistor that was there. This allows the sweep to be moved about a quarter inch either way from center. My final schematic for the power supply is shown as Figure 2.

Well, I can hear the readers asking how a couple of 6AU6 tubes feel, being given only five volts of heater power from the filament winding that used to light up a rectifier tube in an earlier life. Answer is: they haven't complained yet. But the way around that if you're losing sleep over the wrong heater voltage is to plug in a pair of 4AU6 or even 3AU6 tubes with some dropping resistance in the heater lines. Besides, serious audio fans know that all the best preamp tubes are always run at a lower heater voltage to keep noise at a low level.

To finish off this project, I added a neon pilot light, moved the WIDTH control to the front panel, and provided a five-volt AC test signal at a little feedthrough test point near the input jacks. Noticing that there was a bit of AC field pickup from the power transformer, I had a choice of shielding the CRT or the transformer. The photos show how the steel cage made from a coffee can fits over the back of the 'scope, effectively killing the pickup and hiding the most of the HV parts at the same time.

If I were going to use this item on the bench, I'd wrap a wooden box around it, add a line fuse, and provide a three-wire power cord as well! Finally, I'd keep in mind that the scope input presents a 100 K load to any circuit under observation. Good enough for audio work up to 600 volts, though!





Two views of the completed breadboard oscilloscope.

News

Doug Fox, of St. Charles, IL, wrote to me about his restoration of a two-inch oscilloscope and then wrote a nifty article for *Antique Radio Classified* on that topic. You can find it in the October issue.

I have to make more room in my shops for future work, so I'm going to dispose of some of the breadboards described in this column. I'll entertain offers from the AWA membership before the whole shebang goes on Ebay!

REFERENCE

Pulse and Digital Circuits, Millman and Taub, McGraw-Hill Book Co, 1956, pp 234-5

THE VACUUM TUBE, *continued from page 27*

a hole to expose the top of the bulb. Fig. 5 depicts the CA19B.

Some freak latter-day "MG"s have turned up lately. Fig. 6 shows a "12SK7C" as made by RCA's Brazilian subsidiary in Sao Paulo. Branded with the post-1969 RCA logo and "Industria Brasiliera," it bears a date code of "26/70," which probably represents the 26th week of 1970. Opening the aluminum shell reveals a miniature tube, undoubtedly a 12BA6, with wire leads attached and threaded into the octal base. (Thanks go to Jim Cross for the sample.)

Two more late-model oddballs from Sylvania are in Fig. 7. At left is a 6SQ7 in an unusual large-diameter steel shell. The glass tube inside is etched "6SQ7GT." Even its elements are unusual: the mount "has got to be" from a miniature 6AV6, but with a large-diameter lower mica. At right is a tube double-branded "6SF5" and "6SF5MG," in the oversize steel shell normally used for 6V6s and the like. Inside is—voila!—a miniature socket with tube plugged-in.

The miniature is unetched but is probably a 6AV6 with its diodes unused. It has the four little pinch marks in the glass at the top of the bulb that are commonly found in Philips production. Presumably Sylvania got orders for metal 6SQ7s and 6SF5s after shutting down their metal-tube production machinery, and cooked up these substitutes.

So the "MG" tube didn't die with Arcturus or Triad—it lived on long after their time!

REFERENCES

1. Bro. Patrick Dowd, "History and Development of the All-Metal Radio Tube," *OTB*, Vol. 33 No. 2 (June 1992), pp. 22-33.
2. John Stokes, *70 Years of Radio Tubes and Valves* (Chandler, AZ: Sonoran Publishing, 2nd Ed., 1997), pp. 99-100.
3. Jim Cross, "Gold Seal Metals: The Whole Line," *Tube Collector*, Vol. 4 No. 2 (April 2002), p. 13.
4. Standardizing Notices 3-2-CA19, 3-2-CA19B, 3-2-CA19C, 3-2-CA19D, and 3-2-CA19E,in Binder 85 of the Dowd-RCA Archive, an AWA Museum resource.

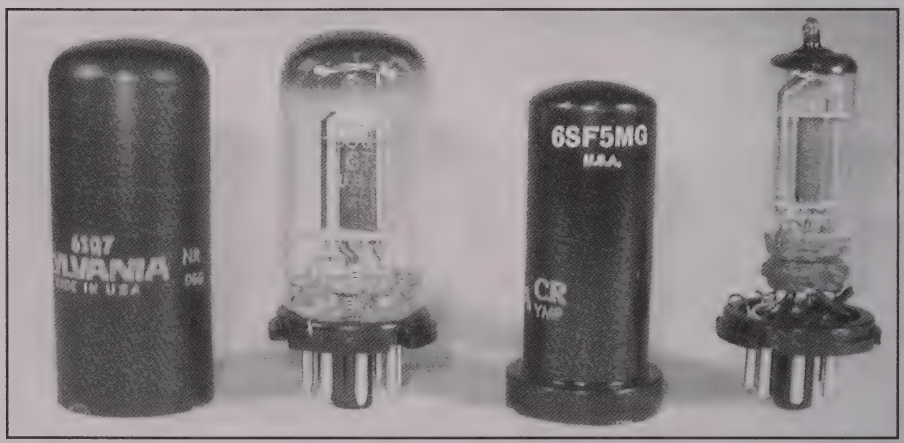
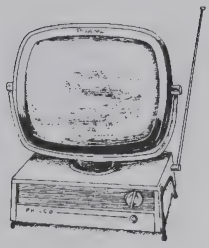


Fig. 7 - Two late Sylvania MGs

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD, CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



Restoring a British HMV 904: Part 1—The Circuitry

By Hugo Holden
P.O. Box 918, Maroochydore, 4558,
Queensland, Australia

As some of you may know, I am writing again from Africa; this time, Sierra Leone. Since joining Rotary International last year, I got involved in a project to send 240 new wheelchairs to this war-torn nation. Quite exciting work!

In this issue we begin another restoration article by Hugo Holden, recipient of the AWA Taylor Award for 2002. This current restoration is also Taylor Award calibre!—RB

The British 405-Line Standard

Electronic television technology was exploding on both sides of the Atlantic in the years leading to World War 2. The BBC began transmitting in 1936, from Alexandra Palace on a hill in North London. The Palace housed the studio and a 17 kW double sideband transmitter. It ceased transmission in 1953, when the Crystal Palace in South London, a 200 kW vestigial sideband transmitter, went into service. A new transmitter, opened in Birmingham in 1949, was a 60 kW vestigial sideband system.

The video carrier was 45 MHz, AM modulated, but with reverse modulation: synchronizing pulses reduced the carrier and white level increased it, opposite to the American system. The sound carrier was AM modulated, 41.5 MHz and 6 dB down in level with respect to the video carrier. The EMI television system specified 25 frames per second, interlaced scan, 405 picture lines, and as a result, a field frequency of 50 Hz and line scanning frequency of 10,125 Hz.

Many observers have commented on the audible whistle of the line output stages in British 405 line television sets. The modern British 625 line standard, with a 15,625 Hz line frequency, is beyond audible limits for many people.

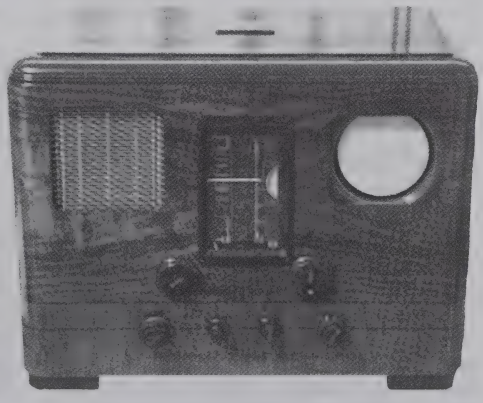
The idea of restoring a 405-line set seemed very appealing. After comparing and contrasting the two American pre-war sets on which I previously worked, the idea of restoring a British set of the time was really irresistible. I was looking forward to experiencing its performance first hand.

Unique Features of the HMV 904

This 5" television set, introduced in the United Kingdom in 1939, is quite remarkable as it is also a 6 tube multi-band radio of very compact design. The radio tunes over 16.5 to 50 metres (short-wave), 200 to 570 metres (medium wave) and 725 to 2000 meters (long-wave) using a very elaborate chain-drive vernier scale. The set cost 29 guineas new and a 7 inch version, the 905, was available for 35 guineas.

The tubes employed in the radio frequency, local oscillator and audio stages are used in both the television and radio modes. This is achieved with a fairly complex arrangement of IF transformers, combined multi-coil units, and a very elaborate multi-wafer band-switch. The IF transformer coils in the television section have large brass tuning slugs and this technique results in a decrease of inductance of the coils they tune.

Other unique circuit features which will be discussed include the frame output stage, the line output stage (without a damper diode) and the very impressive "anode bend" detector/combined video



The handsome HMV 904 after restoration.

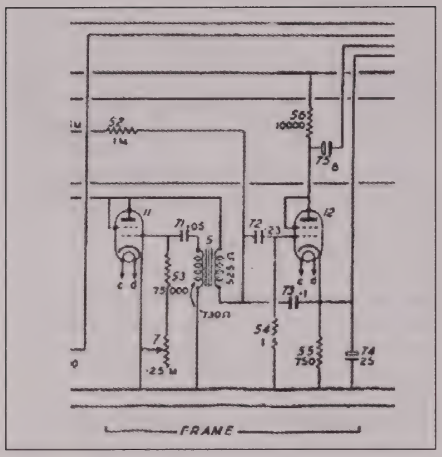


Fig. 1. Frame output stage.

output stage. The 904 employs magnetic deflection for line and frame, and magnetic focus. The two American pre-war sets which I have restored employ electrostatic deflection and focusing.

Frame Output Stage

The vertical deflection yoke in this set has a relatively large number of turns and a high DC resistance (5K). The anode load of the output tube (V12—see Fig. 1) is a 10 K carbon power resistor. The yoke is coupled to the output by an 8uF electrolytic capacitor from the anode and returned to the cathode. The load, unlike modern magnetic deflection circuits, is dominantly resistive, not inductive reactive.

The anode voltage waveform in this set is nearly perfectly saw-tooth in character, producing a saw-tooth scanning current. (When the load is partially reactive the correct drive waveform is trapezoidal, ie, a combination of a saw-tooth and a rectangular wave, resulting in the saw-tooth scanning current). The plate resistor they have used is very inefficient; however it does provide a satisfactory degree of damping, doesn't occupy much space, and was obviously a cost-saving option.

Line Output Stage

This is an interesting stage based on V13 and V14 (see Fig. 3). The blocking oscillator is configured in the screen grid circuit of V13 and the output derived from the plate to drive V14. Feedback from the output transformer to the oscillator transformer via C85 appears to assist rapid flyback. The output transformer core can just run satisfactorily at 10,125 Hz. If this circuit is set to run faster the linearity suffers badly with compression of the left side of the raster.

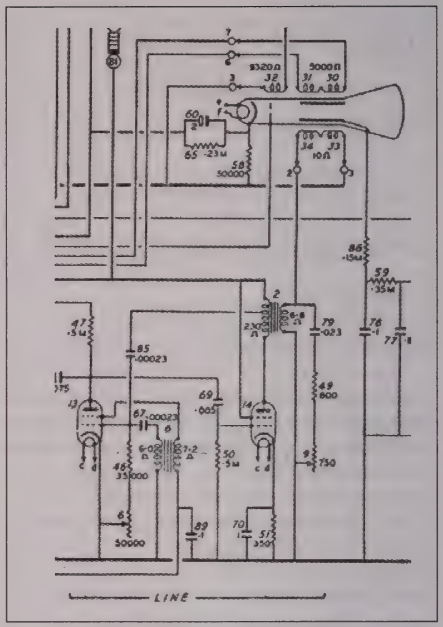


Fig. 2. Line output stage.

The line yoke coils have a very low DC resistance (around 11 ohms), and represent a very inductive load. There is no damper diode, and the damping is merely resistive. This damping, and to a degree the linearity, is adjusted by a control labeled "Form." Despite the lack of damping, the linearity on the correct scanning frequency is quite acceptable.

Note: It appears that the first person to postulate the use of the damper diode, in 1936 in the UK, was Alan Dower Blumlein, the "inventor" of stereo audio. He patented "binaural audio recording" in 1931. Tragically he was killed in a plane crash in 1942 testing radar systems.

Damper diode function was very well examined by RCA laboratories (post war period) in an article by Otto H. Schade [1]. In this article reference is made to Blumlein's original 1936 patent for a non-linear deflection circuit with diode. Over the years "efficiency diode" or "booster diode" became synonymous with damper diode.

In these early years it became obvious that magnetic deflection circuits really only needed to be energy control/management systems. In deflecting a beam about center, no overall energy would be required, only enough to overcome losses. This is analogous to a swinging pendulum, requiring small amounts of additional energy per cycle to keep it going. Despite the early

(continued on page 36)

NEW BOOKS AND LITERATURE

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Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

A Candid Autocamera Biography
By George H. Clark. Published 2002 as Tube Collectors Association Special Publication No. 4 (A Tribute to George H. Clark), TCA Inc., P.O. Box 1181, Medford, OR 97501; website www.tubecollectors.org. 5 1/2 x 8 1/2 inches, 30 pages, softcover. Includes CD of an interview of Clark conducted by G. F. J. Tyne, July 28, 1950. $18 for the package, which also includes a copy of all TCA back issues for 2002. May also be ordered from tca@jkasystems.com using PayPal. Direct questions to Ludwell Sibley at 541-855-5207 or tubelore@internetcds.com.

This little publication brings to the surface the story of a radio pioneer many of us would never have heard of otherwise. Clark (1881-1956) was a character, all right. Soon after John Stone hired him as an assistant in the early 1900s, Stone realized that Clark's math talents were somewhat deficient and offered to pay his way through a math course at MIT. But after a few months Clark dropped out, realizing he "hadn't the faintest idea of what it was all about."

Later Clark worked for years in a variety of odd jobs with RCA. During one of these he was sent to Venezuela (he knew no Spanish) to install a series of transmitters. It was while he was there that RCA chose to "give him the sack." Clark solved that problem by simply returning to the US and continuing to work for RCA. For its part, RCA simply continued to pay him!

The hour-long CD interview leaves the listener wanting more. In particular, more about all the radio pioneers that Clark knew personally—Armstrong, Stone, de Forest, Miessner, Kolster, Weagant, Sarnoff, etc.

But surely Clark's biggest contribution to radio history resulted from the fact that he was a saver. Generally, if it was written or printed and about radio, if Clark got his hands on it, he saved it. This included entire libraries of primary material from RCA, Hammond, Jenkins, Farnsworth and others. Much of the final collection, too vast even to outline here, eventually wound up at the Archives Center of the Smithsonian National Museum of American History. You can see a detailed contents listing of that material at *www.si.edu/lemelson/dig/radioana/#bio*.

♦ ♦ ♦ ♦

Uncle Tungsten: Memories of a Chemical Boyhood
By Oliver Sacks. Published 2001 by Vintage, 800-733-3000, e-mail www.vintagebooks.com. 5 x 8 inches, 337 pages, softcover, $14.

Occasionally we notice books outside AWA's purview but still of potential interest to readers of *The OTB*. Such is the case with Sacks' delightful autobiography of his childhood and adolescent years.

To say Sacks had an unconventional childhood is an understatement. He was largely self-taught with the help of books, museums and a variety of brilliant aunts and uncles who fostered his scientific interests and never discouraged his early investigations and experiments. His Uncle David, aka Uncle Tungsten, operated a tungsten-filament light bulb factory and inspired in Sacks a love of that metal, and metals in general.

While other students his age were puzzling over the periodic table of the elements, Sacks memorized it and investigated its history, from before 1869 when Medeleev devised his version of it to Harry Moseley's definitive "tweaking" of it in 1913-14. (Moseley was killed in WWI at 28).

Other outstanding experiences of Sacks' formative years included repeated beatings by a sadistic headmaster in a boarding school where Sacks had been sent, ironically, for protection from the bombing of London during WWII. It was always understood by Sacks and his parents, both of whom were doctors, that he, too, would be a physician. To that end his mother arranged for the 14-year-old Sacks to perform a human dissection. The cadaver in question, appropriately or otherwise, was that of a 14-year-old girl.

What happens to a person who has had such a childhood? Today Sacks is a distinguished neurologist living in New York City. He is the author of many books, including this national best-seller.

Great Physicists: The Life and Times of Leading Physicists From Galileo to Hawking
By Will H. Cropper. Published 2001 by Oxford University Press, Inc., 800-451-7556, e-mail www.oup.com. 7 x 10 inches, 500 pages, hardcover, $35.

Readers of *The OTB* will probably be most interested in the Faraday and Maxwell biographies here, but the book as a whole is rewarding reading. For each of 30 great physicists Cropper attempts to summarize the most important achievements. He also attempts to present each biographee as a human being. This results in the inclusion of many unprofound though interesting facts, made all the more so when contrasted against the weightiness of the book's main subject.

So in the chapter on Hawking, for example, we find out that during WWII bombing "German *Luftwaffe* agreed to spare Oxford and Cambridge if the Royal Air Force would do the same for Heidelberg and Göttingen." And in the essay on Fermi we learn that Italian pencils have no erasers. What a testament to self-confidence!

Includes Bohr, Boltzmann, Carnot, Chandrasekhar, Clausius, Curie, de Broglie, Dirac, Einstein, Faraday, Fermi, Feynman, Galilei, Gell-Mann, Gibbs, Hawking, Heisenberg, Helmholtz, Hubble, Joule, Maxwell, Mayer, Meitner, Nernst, Newton, Pauli, Planck, Rutherford, Schrödinger, and Thomson.

♦ ♦ ♦ ♦

Wireless: From Marconi's Black-box to the Audion
By Sungook Hong. Published 2001 by MIT Press, Inc., 800-405-1619, e-mail http://mitpress.mit.edu. 6 x 9 inches, 248 pages, hardcover, $34.95.

This book represents scholarship at its best. Not only does Hong have a keen eye for the details he locates in his thorough research, but he couples that with an acute ability to see and analyze the meaning of the facts he finds.

When he reports facts, they are always carefully documented (the 200 pages of text are followed by 29 pages of notes). When Hong speculates as to the meaning of his facts he always carefully lists the reasons for drawing the conclusions that he does.

Hong's essays discuss how emphasis on Hertzian optics tended to delay radio's development, the Marconi *v.* Lodge struggle, Marconi's treatment of Fleming and vice versa, and the effect that Maskelyne's "jamming" of Marconi's demonstration broadcast had on Fleming's career. There is also a very detailed analysis of the long and tortuous road from Edison's "Effect" to DeForest's triode.

The book will give each of its readers new insights into why radio history evolved as it did and why the various players did what they did. It is highly recommended.

Following are some books of lasting interest originally reviewed by the author in The Pittsburgh Oscillator, *newsletter of the Pittsburgh Antique Radio Society. See end of each review for original publication date.*

Radio! Radio!
By Jonathan Hill. Published 1987. Out of print. Available at www.bookfinder.com.

Could you abide having a radio history book on your shelf that made no mention of A. Atwater Kent, Frank Conrad, or RCA Radiola? Jonathan Hill's *Radio! Radio!* is such a book, but you're not with it for long before you don't care that the American side of radio history is generally left out. Hill's book is a 244-page chronology of the story of radio in England from its Victorian beginnings through about 1969.

It's fun to try to find the British counterparts of the likes of Conrad (Captain Leonard F. Plugge?) or RCA (the BBC?) And just as the Hamilton Music Store of Wilkinsburg, PA "sponsored" some of the first U.S. broadcasts, so Selfridge's Department Store in Oxford Street backed the first commercially sponsored program broadcast to British listeners. The year was 1925.

What was the British equivalent of the 01A "valve"? Probably Thomson-Houston Company's 'R' valve. It could be used as a detector, or in high or low frequency circuits. Hill reports that the tube's filament glowed so brightly that "some frivolous people, on occasions when they weren't using their receivers for listening-in, instead merely ... turned up the rheostats high enough to provide light to read by or even to light the room." For those listeners who were annoyed by the bright glow of the R valve's filament, a Mr. R. F. Gordon of Weymouth had a remedy. He marketed a device costing 8d. "Rather similar in appearance and construction to a well-known family planning product, it consisted of a sleeve of black rubberised material which was rolled snugly over the valve, and being opaque, effectively shielded the listeners' eyes from the glowing filament."

In addition to the many details reported as charmingly as this, there are the photographs. Almost a thousand of these, all monochrome, all in clear focus, and almost all captioned in great detail, listing make, model, date, dimensions, type of cabinet, type of circuitry, original price, etc.

Included in the book are nine appendices. The first, "The Golden Age of Loudspeakers, 1922-1930" makes a nice complement to Floyd Paul's *Radio Horn Speaker Encyclopedia.*

This book was obviously written with great care by someone who knew his subject well. (Hill's first book, *The Cat's Whisker, 50 Years of Wireless Design,* was published in 1978). The author also designed the art work on the dust jacket, and Sue Worrall's rendering of it is stunning.

The only fault found with the book is the chronological organization of the index, which would have been more convenient for most users if it had been in one alphabet.

[Originally published in The Pittsburgh Oscillator, *volume 2, number 1, March 1987, page 4.]*

♦ ♦ ♦ ♦

Radio Troubleshooter's Handbook

By Alfred Ghirardi. Published by Murray Hill Books. 8 1/2 by 11 inches, 744 pages, hardcover. Out of print. (Various editions published 1939-1943; see OTB, *August 1994, page 66). Available through http://www.bookfinder.com.*

We have the Douay, the Good News, the Geneva, the King James, the American Standard, and now the Ghirardi. I found a Ghirardi "bible" (so-called by some servicemen) at my last auction. I knew nothing about it and bought it more or less for the heck of it for $12. Then I got it home and started to browse. About an hour later I felt as if I held in my hands a book which listed everything anyone would ever need to know about any radio or service problem.

The Table of Contents alone takes a good while to read and digest. It lists 75 sections plus an index for this compendium of information aimed at the busy 1940s radio service person. A few section headings will suffice to give an idea of the scope of the book:

4. I-F Alignment Peaks of 20,816 Superheterodyne Receivers.
9. Gear Ratios and Scale Calibration Directions Required in Remote Tuning Controls for all Auto-Radios.
10. Routine Auto-Radio Installation and Interference Elimination Data Chart for All American Passenger Cars.
14. Recommended Replacement and Electrically-Comparable Batteries for 1250 Models of Portable Radio Receivers.
33. Pilot and Dial Lamps Characteristics and RMA Bead Color Code Chart.
55. Power Transformer High-Voltage-Winding Requirements for Operating Various Types of Rectifier Tubes.
75. Directory of Radio Manual, Handbook and Textbook Publishers.

But by far the most fascinating section of the Handbook is "Case Histories of Common Trouble Symptoms and Remedies for 4,820 Models of 202 Makes of Home- & Auto-Radio Receivers and Record Changers." Ghirardi says this section represents in condensed, tabulated form the accumulated servicing information gained by thousands of hours of actual experience in service work.

For each model this 405-page section lists problems common to that set, such as noisy reception fading, broad tuning, inoperative, etc. Possible solutions are described for each problem.

For example, when I was restoring a Philco 84 I noticed a loud hum in the audio even after the filter capacitors were replaced. After a lot of unsuccessful attempts to eliminate the hum I thought to look in the Ghirardi book. There for Model 84 opposite the heading "Loud Hum" were three suggested causes. The second one was "loose or corroded ground lug rivet for filament supply on 42 socket. Place an additional ground at this connection." By following these directions I eliminated the unwanted hum.

This is just the sort of guide needed by those of us who aren't too sure of what we are doing when we get inside a chassis and it has us stumped. It doesn't take many experiences like this with a service guide to make you want to keep it right there on your service bench forever.

Ghirardi bibles are rare and getting rarer. If you don't have one and see one at a sale, my advice is to say, "I'll take it." You can always ask the price later.

[Originally published in The Pittsburgh Oscillator, *volume 7, number 3, September 1992, p. 14.]*

♦ ♦ ♦ ♦

Historical Dictionary of American Radio

By Donald G. Godfrey and Frederic A. Leigh, editors. Published 1998 by Greenwood Press, P.O. Box 5007, Westport, CT 06881-5007, Tel. 800-225-5800, 520 pages, hardcover. $89.50. Available from www.amazon.com.

The word "dictionary" in the title is somewhat of a misnomer. Although entries in the book are alphabetically arranged and many radio terms are defined, the book is, in fact, a single-volume encyclopedia of American radio. Entries range from a few lines to a few pages in length. Though the period covered extends from radio's beginnings, many of the articles describe current radio features and practices.

Hardware enthusiasts will be disappointed. The book emphasizes the programming side of radio, and there are no illustrations, graphics or

charts. Nevertheless, nothing has appeared yet that comes even close to what this reference volume does for American radio and its history. Sidney Gernsback's well known 1927 Radio Encyclopedia (which does emphasize hardware) makes a nice historical companion.

Interspersed with concise definitions of radio terms (e.g., hot clock, narrowcasting, payola-plugola, diary, duopoly, topless radio, zoo format, etc.) are more extensive articles on general subjects and historical processes in radio, such as radio legislation, racial issues, propaganda, the fairness doctrine, public radio, the press-radio war, etc.

Biographies appear for such diverse on-air personalities as Wolfman Jack, FDR, Don Imus, and the Lone Ranger. Behind-the-scenes people (Frank Conrad, Mahlon Loomis, Marshall McLuhan, Marconi, Sarnoff, Owen Young and many others) are also present. Roy Rogers gets a one-page entry; Gene Autry gets none (though information on him can be found by using the index). Radar gets no article in the book, no entry in the index, and is not mentioned in the article on radio and WWII.

Company and organization histories are included—the BBC, CBS, FCC, NPR, Pacifica Foundation, Press-Radio Bureau, RKO, United Fruit Company, etc.

The book includes an extensive 27-page bibliography of sources. Many of the articles have bibliographies attached, and some of those include World Wide Web addresses. This feature will be seen more and more in reference and other books, but readers of this review are cautioned about the often-short-lived nature of Web addresses and information. A handy but limited eight-page radio chronology (1837-1997) is included in the book's front matter.

About 100 authors contributed entries. Surprisingly, Alan Douglas is not among them, although his works are referred to throughout the book. Contributors worked independently, and this sometimes results in repetition of information, but the editors have done a good job of controlling the pace, tone and style of the book as a whole. It can be enjoyably read through from cover to cover.

Historical Dictionary of American Radio is enthusiastically recommended. It will see years of use as a starting point for researchers, librarians, radio historians and the general public. We hope someone is now working on the *Historical Dictionary of American Television*, and that it will be of equal quality.

[Originally published in The Pittsburgh Oscillator*, volume 14, number 2, June 1999, p. 6.]*

TELEVISION, *continued from page 32*

work by Blumlein in the UK, the damper diode concept had not found its way into the HMV 904.

Detector/Video Output Stage

This is based on the MS4B V9 (see Fig. 4), a metalised glass tetrode biased to be an anode bend power detector. This is the first time I have encountered such an application in a television. It is a very good idea. The anode is direct-coupled, via L29, C60 and R65, to the CRT's cathode.

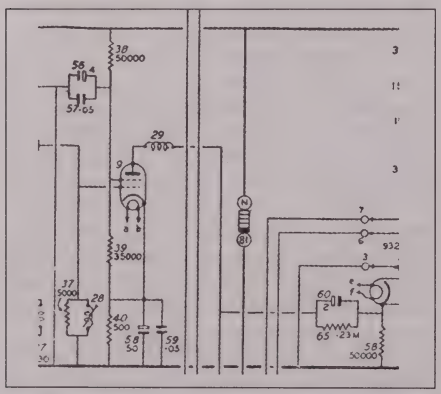


Fig. 3. Detector/video output stage.

In effect the tube is biased as a class AB amplifier. The no-signal plate current is very low compared to its class A counterpart used in most television sets. This saves power loss in the anode load resistor.

The grid is driven directly with the video carrier, and the positive half cycles of the carrier are preferentially amplified due to the bias conditions being set for that mode. The carrier is filtered off by L29 and the associated capacity of the components and cathode circuit of the CRT. Oscilloscope analysis of the detected and amplified video shows it to be excellent, and 25 to 30 volts peak-to-peak video is obtained without any difficulties.

REFERENCE

1. *Magnetic Deflection Circuits for Cathode-Ray Tubes*, by Otto H. Schade. Television Volume V 1947-1948, RCA Review, Radio Corporation of America, RCA Laboratories Division, Princeton New Jersey. Pg 105.

This article will be continued in the May issue, when we will cover Hugo's fine restoration of the HMV 904.

The Operatone Horn Speaker

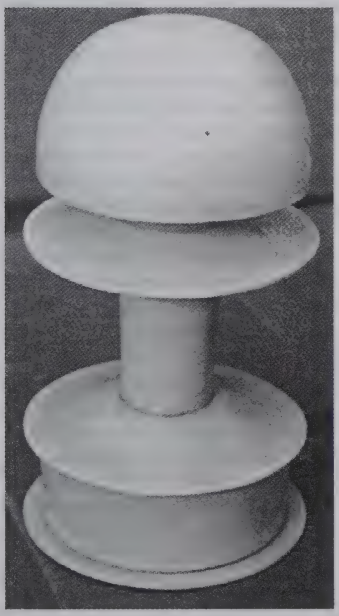
And…weighing in at a mere 7½ ounces…I give you…the "Operatone" speaker. This tiny horn speaker was sold for $7.50 in 1925 by the Piroxloid Products Corporation of 200 Fifth Avenue, New York. The small cardboard box it came in boasted "Small and Mighty." "Small" was no exaggeration, as this midget measures only 5⅜" tall, with a base of 2⅞" across. The upturned bell is a mere 2½" in diameter.

But size wasn't the Operatone's only unusual feature, for it was made entirely of celluloid. This material was called "Piroxloid" by the manufacturer. The device was not cast in one piece, but assembled in six pieces which are cemented together. It was offered in two colors: transparent tortoise shell (swirled mahogany), and opaque ivory.

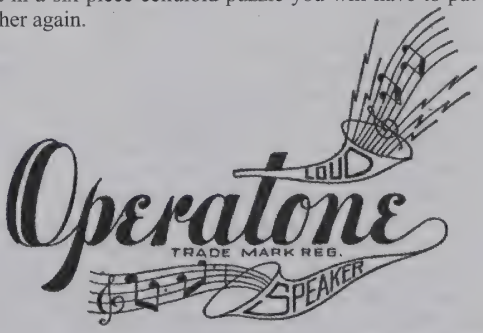
The unmarked reproducer inside the base acted also as a weight to stabilize the delicate construction. Sound was directed upwards through the center tube to the domed cap above and diverted back downwards onto the round sounding disc just below. The manufacturer claimed that this cap was equipped with a special composition gasket which would absorb the shock the driver would produce from any highly amplified signals.

Original box still has instruction sheet inside.

Another claim was that the reproducer's diaphragm was made of a "special heat-treated metal, heavy in silicon." This feature was supposed to insure a natural tone when vibrating.These unusual speakers are seldom seen and are considered somewhat rare by collectors . . . especially accompanied by the original box. However, be warned! Due to the Operatone's age and delicate construction, rough handling will result in a six-piece celluloid puzzle you will have to put together again.



The midget Operatone is only 5⅜" tall, 2⅞" across at the base.



The Communications Receiver

EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

The Echophone Commercial Model EC-1

By Jim Hanlon, W8KGI

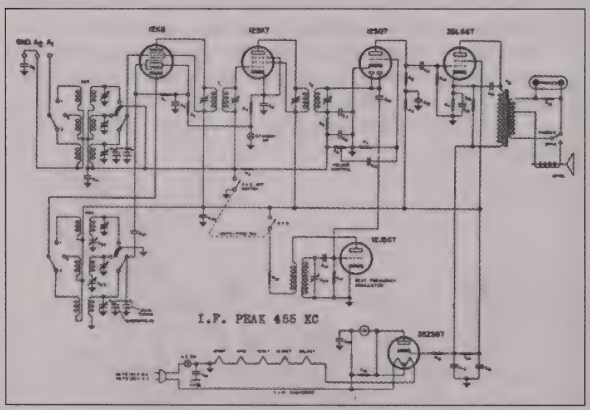
Guest columnist Jim Hanlon returns again to our pages, this time with a review of an interesting and historically significant little radio that the uninitiated might be likely to ignore at a flea market table. While it is admittedly a "cheapie," it does meet the classic definition of a communications receiver, and in fact, as Jim tells us, it can function as one if carefully used. Coupled with his description of the set are his comments on how he restored two of them—W2DGB

The editor has described several AC/DC receivers in recent "Communications Receiver" columns, and this has inspired me to review yet one more, the 1941 Echophone EC-1. This little radio is significant because it is the original prototype that evolved into the Hallicrafters S-38 series after WWII.

According to Raymond Moore in his book, *Communications Receivers, The Vacuum Tube Era*, Echophone started in Southern California in the early 1920s, where the company owned broadcast stations and built receivers. They moved to Waukegan, Illinois in 1930, where the firm manufactured 1000 sets a day. Echophone later moved to a plant at 2611 Indiana Avenue in Chicago. By the mid '30s, however, they fell prey to the depression, going out of business in 1936. Bill Halligan of Hallicrafters acquired both the Indiana Avenue plant and the valuable RCA manufacturing licenses from Echophone in August 1936, at which point the Echophone name temporarily disappeared.

When World War II started in Europe in 1939, the materials and components needed to build communications receivers for the civilian market became scarce. In 1941 the Hallicrafters team introduced a trio of receivers that would be both easier to produce under these circumstances and lower in price than their regular product line. They all covered the 545 Kc to 30 Mc tuning range in just three bandswitched ranges, and they all had series filament strings and transformerless ac/dc power supplies.

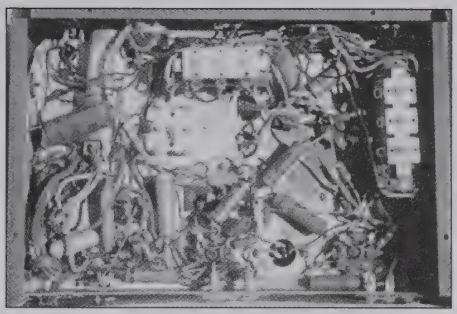
But Hallicrafters did not want to associate their good name with products that the public was likely to regard as cheap, low quality radios, so they resurrected the Echophone name for these sets. They even used the side-door address of the Echophone/Hallicrafters plant, 201 East 26th Street, in the Echophone ads.



Schematic of the Echophone EC-1. We apologize for the poor quality. This copy is a little sharper than the author's, but details are still not readable.

At the top of the line was the eight-tube EC-3, featuring one RF, two IFs, a crystal filter, a noise limiter, and calibrated amateur bandspread. It was electrically similar to the $69.50 Hallicrafters SX-24, but it sold for only $49.95. The EC-2 had seven tubes: one RF and only one IF with no crystal filter, a noise limiter, and calibrated amateur bandspread. It was similar to the $49.50 Hallicrafters Model S-20R, with a selling price of $29.95.

The little EC-1 had just six tubes: a 12K8 converter, 12SK7 IF, 12SQ7 detector, AVC, and first audio stage, 35L6 audio



Front and under-chassis views of the restored receiver.

output, 35Z5 rectifier, and a 12J5 bfo. It was similar to the $29.50 Hallicrafters S-19R, but it began by selling for only $19.95, "the greatest value ever offered in a Communications Receiver," according to its debut ad in *QST* for February 1941. The Echophone ads mentioned only the EC-1 after October, and its price had bounced up in several steps to $28.50 by the time my EC-1 manual was printed in 1943.

I recently acquired my first EC-1 through a friend at work. He knew that I liked old radios, and he had another friend with an old "Echophone Commercial" radio for sale that I offered $20 for, sight unseen. It turned out to be all there except for the squarish, plastic dial cover that had been broken off sometime in the past six decades.

About that time I discovered another EC-1 on EBay, this one with an intact dial cover but missing its metal top plate and speaker and its cardboard back. I bought it, thinking I would make the two partial radios into one whole one. But when the second one arrived I found that the cabinet paint, a brownish-gray crackle, did not match between the two receivers and that I couldn't remove the dial cover without breaking it, so I finally wound up restoring both radios.

As you can see from its schematic diagram, the EC-1 is the archetypical "All-American Five" 5-tube superhet with an additional sixth tube for a bfo. It has the same electrical line-up as the original S-38 except for its converter, a 12K8 instead of a 12SA7. It even has the same style of tuning capacitor as the S-38, with a single-plate bandspread rotor mounted on the frame of the main tuning capacitor for each of the local oscillator and mixer sections.

By the way, you will notice that the schematic has no component values or identification numbers printed on it. The manual does contain a list of component values, but as Peter, The Manual Man, who supplied it said, the service man had to be just a little bit clairvoyant to figure out what the parts are supposed to be.

Fortunately all of the original parts were still in place in both of my receivers and none of them were unreadable, so I was able to fill in the puzzle without any real trouble. The only things I needed to replace in both receivers to get them running were the power supply filter capacitors, both bandspread dial cords, one paper bypass capacitor and a couple of resistors, and several tubes.

I made a new top plate with speaker and a cardboard back for the receiver with the good dial cover, and I cut a new dial cover from a flat piece of Plexiglass for the receiver with the good cabinet. *(Note: A common failing with these sets is the broken/missing hard rubber or plastic edging for the dial cover. Jim solved this problem neatly by carefully rounding the edges and corners of the replacement, and then masking and painting the black edge directly on the Plexiglass. —Ed.)*

Both radios needed new power cords, and I used cut-off extension cords with polarized plugs (with the larger, ground lug connected to the receiver chassis) so that the chassis would always be at AC-ground potential. The chassis in the EC-1 is electrically isolated from the cabinet by four rubber grommet mounts that were still pliable in my radios, but it is bypassed to the cabinet with a 0.25 mfd capacitor; and I do not want to have that capacitor connected between the hot side of the line and my body attached to ground!

To make the box a little safer, I also installed a DPDT switch that I use for turning power on and off, in series with each side of the line cord, just outside the receiver cabinet. Then I shorted the internal power switch on the volume control. That way there is no possibility of the chassis being hot to ground through the filament string when the set is turned off. I am also using the original Hallicrafters knobs that have well-recessed set screws, so that there is no danger of my coming into electrical contact with any of the control shafts.

Alignment was quite straightforward on both

(continued on page 42)

BY HENRY M. BRADFORD

Did Marconi Receive Transatlantic Radio Signals in 1901?

We are again fortunate to have another article from Henry Bradford on the early years of the Marconi transatlantic stations. Henry presents a thought-provoking discourse on the controversy associated with Marconi's earliest transatlantic experiments. There's no doubt in my mind that, due to Marconi's misunderstanding of the limitations of his receiving equipment, the letter "S" was really heard on HF, not on MF as the inventor claimed.

Give this article a whirl and see if you are convinced. If you are convinced, you might speculate, as I did, where communications technology would be today if the communications effectiveness of HF was uncovered at the turn of the 20 th century, instead of some 25 years later.— Frank J. Lotito, Editor, "Below 535"

In December 1901, Marconi claimed to have received, at St. John's, Newfoundland, a radio test signal transmitted by his high-powered spark transmitter station at Poldhu, Cornwall, England. This was the first reported transatlantic radio transmission, and it convinced Marconi that a transatlantic radio service was possible. In spite of his subsequent successes in transatlantic wireless communications, his celebrated original claim has remained the subject of controversy.

The doubts today centre around the reported wavelength and time of day: 366 metres (820 kHz), around midday and early afternoon at St. John's. At this time, much or all of the transatlantic path was in daylight. In the light of modern knowledge about radio propagation, Marconi could hardly have picked a worse combination of frequency and time of day for the transatlantic experiment. Imagine attempting transatlantic transmission on the North American AM broadcast band in the middle of the day!

As most radio listeners know, reception at these frequencies typically is restricted to within a few hundred miles from the station in the daytime, though it may extend many times further at night. The reason for this is this is that the D-layer of the ionosphere absorbs the energy of radio waves in this frequency range during the day, but disappears at night, allowing long distance reception via reflections from higher levels in the ionosphere.

So how did Marconi receive transatlantic radio signals in the middle of the day in what now is the AM broadcast band —if indeed he did? Let us examine all his early efforts at long distance radio communications for an explanation. (See References [1] through [3] for full descriptions of the events and equipment.) In 1900, Marconi built a powerful new shore station at Poldhu, Cornwall for ship-shore radio communications and experimentation. It was designed by Professor J. A.

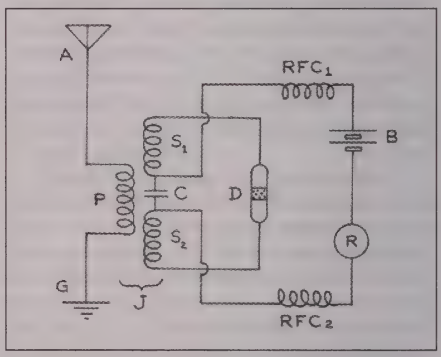


Fig. 1. Schematic of untuned receiver. A = antenna; G = ground; J = r.f. antenna transformer (called a "jigger"); P = primary coil; S1, S2 = halves of split secondary coil; D = coherer detector; C = r.f. bypass capacitor; RFC1, RFC2 = r.f. chokes; B = Battery; R = relay. When triggered by an r.f. signal voltage from J, the resistance of the coherer dropped, increasing the current in the d.c. circuit consisting of D, S1, S2, RFC1, RFC2, B and R. The relay circuit was isolated from the r.f. circuit by RFC1, RFC2 and C. The relay typically activated a paper chart recorder and a tapper (not shown). The tapper decohered the metal filings in the coherer to restore it to a sensitive (high resistance) state for the next signal.

AUTHOR'S ADDRESS: SITE 1, COMP A0, RR2, WOLFVILLE, N.S. B0P1X0

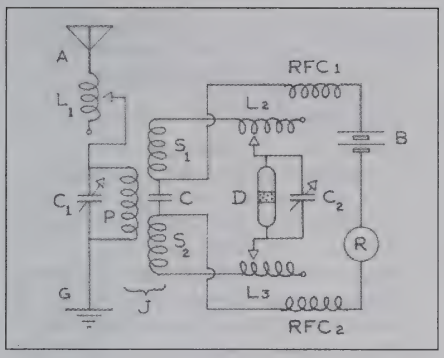


Fig. 2. Schematic of tuned receiver. The basic circuit is the same as the untuned one shown in fig. 1. L1, C1, L2, L3 and C2 were added for tuning. The circuits of Fig. 1 and Fig. 2 were adapted from reference [2].

Fleming, a prominent electrical engineer. The station employed a spark transmitter, but unlike its battery-powered predecessors it was powered by a 35 kilowatt alternator. Encouraged by ranges of several hundred miles obtained with the new station, Marconi decided to attempt trans-Atlantic transmission.

Most scientists of the time felt this was impossible. That opinion was based on the belief that radio waves, like light, should travel in straight lines, limiting radio communications to about horizon distances. Marconi knew that he had already exceeded that limit, and believed that radio waves, for some reason, followed the curvature of the Earth. Therefore he reasoned that with stations of sufficient size and power, he should be able to span the Atlantic. No one at the time knew that reflections from the ionosphere could greatly extend the range of radio transmissions.

Marconi chose Newfoundland as the receiving site for his first transatlantic experiment in order to minimize the length of the propagation path. In December, 1902, he sailed to St. John's with portable receiving equipment and set it up on Signal Hill, about 2100 statute miles, or 3500 kilometres, from Poldhu. The transmitting antenna at Poldhu was a fan, broadside to the Atlantic, made up of 54 vertical wires. The top of the fan was 60 metres (about 200 feet) wide, and was suspended 48 metres (about 160 feet) above the ground. The wires came together at the lower end where they were connected to the feed line to the transmitter. (See page 36 of Reference [3] for a good photo of it.)

The test schedule required Poldhu to transmit sequences of S's (three dots) in Morse code, together with short messages, interspersed with five-minute breaks at intervals. The transmissions took place from 11:30 a.m. to 2:30 p.m. Newfoundland time each day beginning December 11 [4]. The reported wavelength was 366 metres (820 kHz), and although there has been some controversy about this figure, it seems consistent with detailed modern analysis of the Poldhu transmitter [5,6].

Descriptions of the receiving equipment used are sketchy, and the details reported by different sources vary. I believe that the combined descriptions best fit two types of receiver developed by Marconi prior to 1900: an untuned receiver and a tuned ("syntonic") receiver. (See Figures 1 and 2.) Since there was no electronic amplification, the critical component in these receivers was the detector.

The detector used was called a "coherer," and there were two principal types. The best known of these consisted of a glass tube containing metal filings held between two metal plugs that served as electrodes. When a RF signal voltage was applied across its electrodes, the filings cohered, lowering the resistance of the device and causing the direct current in a battery circuit containing the coherer to increase.

This direct current typically operated a relay which fed a larger current to a paper tape recorder. The latter current also operated a tapper which decohered the filings after the receipt of each signal. Basically, the coherer acted like a voltage-controlled switch that closed when a radio signal was received. Many people were involved in the development of the coherer, including Sir Oliver Lodge, who gave the device its name.

In the second type of coherer, a drop of mercury was used in place of the metal filings. It was called a self-restoring coherer because it did not require a tapper. The behavior of this instrument is not well understood, but its detector action may have been principally due, like that of a diode, to its non-linear I-V characteristic. Although known as the "Italian Navy Coherer," this detector, used in conjunction with a "telephone" (earphone), probably was developed originally by Sir J. C. Bose of India [7]. Since there is a potential node and current antinode at the bottom of a grounded vertical aerial, Marconi stepped up the signal voltage applied to the coherer by means of a RF transformer, called a "jigger," in both his untuned and tuned receivers. The principal difference between the tuned and untuned receivers was that the primary and secondary circuits of the jigger were tuned in the former by means of variable inductors and capacitors, whereas no effort was made to tune the circuits of the latter.

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COMMUNICATIONS RECEIVER, *continued from page 39*

radios after I figured out where the local oscillator and mixer padder capacitors were. Someone had tightened down all of the screws on the two IF transformers on one set, and as a result it had several IF responses, none at the intended 455 Kc. I finally peaked the transformers at one of the stronger responses and then walked the adjustments up to the correct frequency.

The local oscillator and mixer adjustments were straightforward, and I set them at the top end of the band for correct calibration and best gain, respectively. The local oscillator also has padder capacitors for calibration adjustment at the bottom end of the two lower bands.

Mechanically the EC-1 is small—only 7½" tall, 10¾" wide, and 7½" deep. Its cabinet and chassis are made from the same grade of steel as used in its contemporary big brother, the SX-28, and its tube sockets are the same molded plastic. The parts are made by the same manufacturers as those in the SX-28; there are just fewer of them. To lower costs, the three local oscillator coils are all wound side-by-side on a single, sturdy cardboard-tube coil form, as are the three RF input coils. The bfo coil is wound on another cardboard form that is quite a bit thinner.

There is a compression trimmer capacitor, accessible from the back of the set, for adjusting the bfo frequency. And there are also two compression trimmer capacitors built into a single, sturdy, ceramic body to adjust the local oscillator tuning on the two higher-frequency tuning ranges. So while the EC-1 is a bare-bones radio, outside of the cardboard coil forms it was made of pretty substantial stuff. That's probably the reason why my two examples have survived this long.

Echophone ads, especially later in 1941 and afterwards, pitched the EC-1 as an ideal radio for the U.S. soldier or sailor to take along with him in the service. They featured a diminutive character named Hogarth—today he would be called a "nerd"—who was always coming out on top because of his EC-1. The admiral scrubbed the decks for him and pretty girls on a South Pacific island surrounded him to listen to his EC-1.

Since the EC-1 was one of the few communications receivers that appears to have been actually available after the war started, was low-priced, and was small and thus easily carried in a duffle bag, I would not be surprised if many of them actually did wind up being "entertainment radios" for our troops.

In 1945 revised EC-1A and EC-1B models appeared on the scene. They had a 12SA7 converter instead of the 12K8, and were physically identical, except for the paint job and name, to the Hallicrafters S-41G that came out later in 1945.

On the air, the EC-1 works amazingly well for what it is. I have one of my EC-1s sitting next to a window in my "great room" and attached to a 20-foot antenna strung up to a second-floor porch outside. As a casual receiver for AM shortwave broadcast stations and the gang on 75 meters it does a very passable job, given a few minutes to get warm-up drift out of the way.

All CW signals sound "hummy," about T-7, but at least they are copyable and the bfo is not swamped by strong signals. I can even make out 40-meter SSB signals with a little patient tuning. I think this little radio is still doing just what Bill Halligan intended for it to do when he brought it out in 1941, and that makes me feel good. It is indeed the first of "the radios that amazed the experts."

MICS AND MEN

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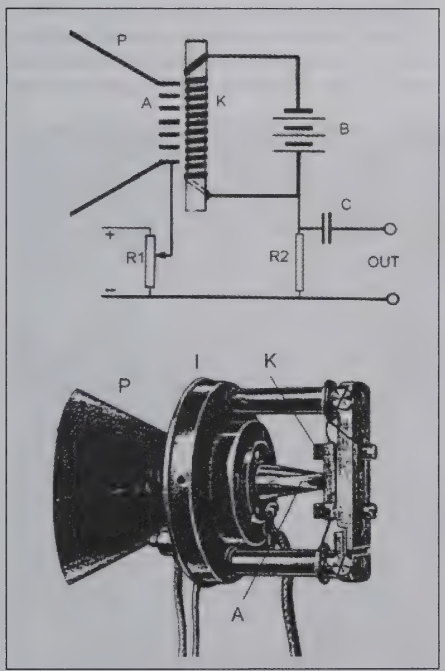
The Mic: The Cathodophone
The Men: Hans Vogt, Joseph Massolle and Joseph Engl

One of the reasons that writing this column is so rewarding is the resulting correspondence from other AWA members. The information for this issue's column was provided by Jean Ritzenthaler of Switzerland [1]. I'd also like to acknowledge the editing assistance of Janet Dell Freeman.

Our featured microphone is the *Cathodophone*. It was patented August 3, 1919 by "Tri-Ergeron." Translated from German, tri-ergon means "3 energies." The three energies/inventors were Hans Vogt of Wurlitz, Germany and two colleagues, Joseph Massolle and Joseph Engl. The frequency response of the Cathodophone is said to have equaled that of the microphones of the 1930s and far surpassed that of the carbon microphones of the 1920s.



Schematic and pictorial drawings of the "Cathodophone." The schematic is the "Fig. 1" referred to in the quote from reference [2] (see text).

Quoting from reference [2], "The Cathodophone worked on the principles of ionized air. In Fig. 1 *[see schematic drawing included with this article], K* is a cathode consisting of a flat heat resistant ceramic support. The heater filament is formed by a thin ribbon of platinum, heated up to a dark red temperature by a current supplied by battery B. The sound to be converted into an electric signal is collected by the pavilion P and directed to the perforated anode A. The anode runs at a positive potential of about 300 volts. Due to the hot cathode which is essentially on ground potential, the air in the gap between A and K will be ionized and a current will flow between the anode and the cathode (if we admit the conventional current flow being from positive to negative). This current can be set with R1 for best performance, usually some 5 mA. Sound waves collected by the pavilion will change the ionized air density between anode and cathode and by the same token modulate the current between A and K. The voltage generated at R2 represents the electric output of this ionized gas microphone. The purpose of C is to eliminate the DC component of the current. To improve efficiency, the platinum ribbon forming the cathode is covered with a thin layer of potassium oxide. The air gap between A and K is adjusted for best efficiency at high frequencies. In average this gap has a width of 0.15 mm."

The Cathodophone was a microphone designed to provide sound on film in much the same way as it is done today. The system was demonstrated in Berlin in 1922. German film moguls failed to understand the significance of the invention and missed an opportunity to develop sound on film. Thereafter patents were issued in Switzerland and the United States and sound on film became a reality.

(1) J. Ritzenthaler, 26 route de Meyrin, CH-1202, Geneva, Switzerland.
(2) Hans Vogt, *The Invention of the Sound Film*, The German Museum, Munich, 1954.
Ibid(3) Pictures courtesy of Tri-Ergon Association.

BY NEAL McEWEN, K5RW

Victorian Era Visual Signalling Instruments

Landline telegraphy was a mature technology widely used by the armies of the world at the turn of the 20th century. However, military units in the field needed a way to signal other units where there were no wires. This photo of the Black Watch 42nd Royal Highland Regiment Signalling unit, taken about 1898, illustrates some of these ways. It provides insight into Victorian era visual signalling technology and the types of signalling instruments used before wireless telegraphy was available or where it was not sufficiently secure.

The high-quality albumen photograph is from the personal album of William Henry Jenkins, who was a Sergeant in the Black Watch. Jenkins was born in England in the 1870s. He served for a time as part of Queen Victoria's bodyguard. In 1905, he and his family moved to Quebec Canada. The photo was obtained indirectly from Jenkins' great-granddaughter.

With the aid of my strongest reading glasses and a magnifying glass I was able to determine quite a bit from this photo. Most of the soldiers in the photo have a crossed flags patch on their shirt sleeve, denoting a signalling unit. All of the soldiers in the photograph, except the one in the dark tunic, are carrying rifles. It is not obvious because the rifle slings are white, the same color as the tunics.

Signallers were trained in flag waving and semaphore, as well as in heliograph and lamp signalling. They accompanied various staffs and units of the British Army. In time of war they would set up fixed or moving stations based on the needs of communication with points of tactical importance. Headquarters might use visual signalling to communicate with a detached unit. Or two advancing parallel units might use it to coordinate their movements.

In some cases visual signalling was used to augment or replace telegraphic communication. When it was not practical to extend telegraph lines and

The Black Watch 42nd Royal Highland Regiment Signalling unit, circa 1898.

equipment to the front, telegraphers and signallers worked together to form a communications chain.

I've provided magnified views from the photograph to show details of the instruments. The soldier on the far left is holding a Mk IV heliograph. The heliograph is an instrument that uses the sun's rays for signalling. Heliographs were first used by the British Army in India in the 1870s.

The first use of the heliograph in war seems to be in the Zulu war of 1877 to 1879. The device came with two mirrors. When the sun is in front of the heliograph, a single mirror is used to reflect the sun's rays to the distant station. When the sun is behind the heliograph, the second mirror is used to reflect the sun's rays into the first mirror.

British heliographs did not have a shutter in front of the mirror. A movable mirror, controlled by a mechanical linkage to a telegraph key, was used to direct the sun's rays to the distant station. The constant movement of the mirror tended to throw the instrument out of adjustment, causing loss of transmission.

The advantages of the heliograph were long range (30 miles or more), portability and rapidity of operation (approximately five to twelve words per minute). The major disadvantage is the need for the presence of the sun.The heliograph can be used with moonlight, but at a very reduced range.

Long-range signalling required that the two stations be on high ground to overcome the earth's curvature and also required the use of a marine telescope. Interception by the enemy was not possible unless they were in the line of sight between the two stations.

Typically the heliograph was operated by three men. At the sending station, the "caller" handled the message form and called out the letters to the "sender," who operated the heliograph. The "answer reader" watched the receiving station for acknowledgment of a word. At the receiving station, the "reader," using the telescope, read each letter and called it out to the "writer" who wrote it down on a message form. The "answerer" acknowledged receipt of a word.

The soldier on the far right is holding a lime light signalling lamp. The lamp creates an intense light by passing a jet of oxygen through an alcohol lamp and onto a pencil of lime, making the lime white hot. Notice the hose running to a bag on the ground. This oxygen reservoir, made of leather, could contain three and one half cubic feet of gas capable of sustaining the flame for 40 minutes. Pressure from the bag was produced by piling earth on top of it.

Photo details showing (top, left to right) Mk IV Heliograph, and lime light signalling lamp, and (bottom) a Mark II Signalling Telescope flanked by two lamps as yet unidentified.

The oxygen was prepared ahead of time by heating chlorate of potash and granulated binoxide of manganese, in a retort, on an open wood fire. The retort was connected to the gas bag through a "wash bottle" to purify the oxygen. Several bags could be filled at one time.

The lamp was keyed by means of a shutter in front a lens that focused the flame. It was sighted by peering through a small diameter tube resting on the alcohol reservoir.

In addition to the lime light signalling lamp, the Begbie Lamp was used. This was a kerosene unit with a lens to focus the light over a great distance. There was an internal shutter located between the flame and the lens. It was operated by a button on the outside of the lamp.

A British Army training manual states, "The shutter is worked in the same manner as the dummy key (see next page). Care should be taken that the shutter is fully opened for dots as well as dashes. Some signallers have a tendency to cut the dots too short, but this should be carefully guarded against."

Dummy key by Houghton-Butcher, circa 1917.

The signalling lamp came in two sizes, standard, used in signal service, and the large as shown in the Black Watch photo for "training schools and special purposes." Both instruments are shown in the British Army *Training Manual - Signalling 1907*. The signalling lamp (or flash lantern as it was called by the U. S. Army Signal Corps) is most useful at night with a throughput about that of the heliograph. The disadvantages of the signalling lamp are that it can be interrupted by the presence of rain, fog or moonlight.

In the middle of the photograph, on the ground, there is a telescope. The telescope is used to observe signalling stations from greater distances than can be seen by the naked eye. This one is shown in a British Army training manual as the Mark II Signalling Telescope.

The telescope not only magnifies the desired object, but also everything else in the field of view. At high magnifications, the distant object may be more difficult to see because of the magnification of dust and moisture particles. The Mark II has three draws and a magnifying power of 15 or 30 depending on the choice of lens at the eye position. The low-power lens is provided for general use and the high-power lens is provided for use on clear days.

On the ground next to the telescope are two small hand lamps. I have not yet identified these lamps, although they are somewhat similar to "Cadet Signalling" lamps shown in an advertisement taken from an Imperial Army book dated 1915.

Several of the soldiers, including the two in the front row at the left and right, have hand flags, used in semaphore signalling. The flags are white with a small diagonal stripe. The white flag was used against a dark background such as a forest. Dark flags were used against a light background.

Semaphore signalling was done with two flags. It was important to keep the flags moving so that they would remain unfurled and easier to see at a distance.

The semaphore system was advantageous because of its portability and the rapid manner in which stations could be set up. However, semaphore signalling is not practical over long distances, at night, or through dust and smoke. The maximum speed attainable is five or six words per minute.

This mode of signalling traces its ancestry to the stationary aerial telegraphs implemented in France in the late 18th century by Claude Chappe. The British Army semaphore system is an adaptation of the British Royal Navy's mechanical semaphore system.

There was also a single flag system called "flag waving." Two different-sized flags were used. A three-foot square flag on a five and one half foot pole could be used for a distance of five to seven miles. A two-foot square flag on a three and one half foot pole could be used for distances of three to four miles.

The small flag was easier to handle and thus could be used for faster transmission of messages. It was moved through a short arc for a dot and a long arc for a dash. The resting position was 25 degrees from the vertical over the head of the flag man.

The flag man could work from either right to left or left to right depending on convenience and the direction of the wind. A dot was made by swinging the flag from the resting position to 25 degrees from the vertical in the opposite direction and returning to the resting position without a pause. A dash was made by swinging the flag from the resting position to 115 degrees from the vertical in the opposite direction and returning to the resting position with a pause in the down position.

The Continental Morse code, later called the International Morse Code, was used with the heliograph, the signalling lamp and single flag signalling. Signallers learned Continental Morse on "dummy" keys. These "dummy" keys resemble an ordinary telegraph key except there are no connections. They makes a sound similar to that of a telegraph sounder. The instructor would call out a letter and then send it on the 'dummy' key; the student learned the sound of the letters and wrote them in block capital letters.

It is interesting to note that instructors used 'phonics such as "toc," "ack," "beer," "emma," "esses," "pip" and "vic" instead of "T," "A," "B," "M," "S," "P" and "V" when calling out letters; this was done to avoid confusion with similar sounding letters such as T and E or A and H.

The key shown here was made by Houghton-Butcher Mfg. in 1917, and is labeled "Key, Dummy, Signallers." This particular one was

used by the 3rd and 4th battalion, Royal West Sussex Regiment. A British Army training manual states, "By obtaining a complete mastery in sending on the dummy key, much time will be saved in acquiring proficiency in sending, both on the heliographs and lamps."

Students were not allowed to practice on the heliograph until they had mastered the "dummy" key. Each soldier in a signaller's unit was tested annually for proficiency in all of the visual signalling methods: heliograph, single flag, lamp and semaphore. The test was to send and receive a message of 200 letters, without the aide of telescope or binoculars, at a distance not less than 500 yards. For heliograph, small flag and lamp, the time allowed was six minutes. For semaphore the time allowed was five minutes. With the deployment of wireless in the very early 20th century, signalling with heliographs, lamps and semaphores took a diminished role in military communications. However, wireless could easily be intercepted by the enemy. So visual signalling was advantageous when the enemy was over the horizon or out of the line of sight. Visual signalling equipment continued to be used through World War II and beyond. Afghan resistance fighters used the heliograph during the Soviet invasion of their country.

Shortly after the photo of this Black Watch Regiment group was made, some units of the Black Watch began serving in the Anglo-Boer War (1899-1902) in South Africa. Considerable use was made of the heliograph by both sides during the this war. In addition to tactical applications, it was employed by the British to replace telegraph lines cut by Boer commandos.

The sunny climate and clear skies of South Africa were ideal for the heliograph; a five inch mirror could be used to 50 miles and a ten inch mirror to 100 miles. Rudyard Kipling makes us aware of the heliograph's wide use with references to it in three poems from "Service Songs, South African War."

Though visual signalling was the primary means of communication with forward units during the Boer War, the telegraph was used to communicate from headquarters to field units down to the division level. The submarine telegraph was used to communicate with the British government.

By the end of the Boer War, British Army telegraphers numbered 2,500 and had handled 13.5 million messages. It is interesting to note that the Anglo-Boer conflict was the first instance of wireless telegraphy being used in warfare. The British had Marconi-built instruments and the Boers had instruments made by Telefunken. In the fall of 1899, six engineers from Marconi, including Charles S. Franklin, later famous for his understanding and application of short waves for Marconi, arrived in South Africa with five portable wireless stations. Due the infancy of the technology and the severe conditions under which they were used, neither side was able to make practical use of their wireless sets. Lightning affected the coherer and poor ground conductivity limited the transmitter range. Dust storms also played havoc with the equipment. In February of 1900, the British Army abandoned the use of wireless in the Anglo-Boer war.

The Anglo-Boer War was the last major conflict to make extensive of the heliograph. The world's armies began phasing out the heliograph after World War I. However, the Canadian Army continued to issue heliographs through World War II.

A final note about the Black Watch. It was formed in the early 18th century to police the highlands of Scotland. It is the oldest and best known of the highland regiments, and It remains a part of the British Army to this day.

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For more information, visit my Telegraph Office home page:

www.metronet.com/~nmcewen/tel_off.html.

On the Internet

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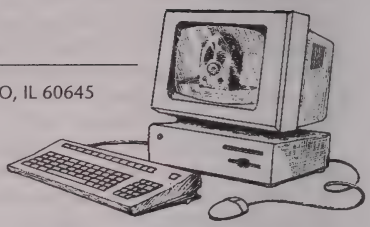


Tube and Valve Data on the Web

Happy New Year! I hope Santa brought you all the goodies you asked for. In one of my previous columns, I discussed websites dealing with electronic parts and components in general. The focus of this installment is on tubes and valves. Specifically data sheets and data manuals that can be found all over the web. The information found on these sites ranges from database searches to full-blown scans of manuals and datasheets. You'll find American and European types that include special use tubes, exotic tubes, CRTs, alpha-numeric readouts, microwave tubes and the ubiquitous general purpose receiving tubes used in radios, TVs and other electronic devices.

A few of the sites listed below also have links to many other related tube and valve sites of interest. There is a wealth of history, data and interesting lore out there well worth exploring further.

Vintage Components
http://www.vcomp.co.uk/manuals/manuals.htm
This UK website features early tube data manuals like RCA, Telefunken and Western Electric. Very well done. The manuals are in .PDF format.

Tube Data by SM0CBW
http://www.tubedata.com/
This site is dedicated to Electron Tubes of all kinds. Information on construction, use and special tubes. Has some illustrated examples as well as other useful information.

NJ7P Tube Database Search by Bill Beech, NJ7P
http://www.nj7p.org/cgi-bin/tube
A simple searching website with data from RCA tube manuals R-10, RC-15, RC-29 and TT-5; TungSol tube manual, 1955; and some GE and Sylvania data obtained from the Nostalgia Air Tube Site.

Tube Datasheet Locator
http://www.duncanamps.co.uk/cgi-bin/tdsl3.exe/
A popular web resource for finding data on vacuum tubes. Has detailed instructions and help files. Simple search form even lets you include Cyrillic characters.

The TechnoPhool Page
http://www.audiophool.cjb.net/Techno.htm
Includes lots of links to electronic sites with tube data, including sites of tube manufacturers and sellers.

WPS Archives—Electron Tube Database, 1958-1961
http://www.wps.com/archives/tube-datasheets/
This database contains technical specifications on 2000+ electron tubes, mainly obscure and hard-to-find devices with American JEDEC numbers. The technical data is contained in high-resolution color scans from over twenty original catalogs from 1958 to 1963.

Noststalgia Air—Tube Substitution and Characteristics Guide
http://www.nostalgiaair.org/NostalgiaAir/otcr.htm
Currently the database includes American substitutes for American and European tubes. Characteristic charts are being added on request.

Vacuum Tubes by J. B. Calvert
http://www.du.edu/~etuttle/electron/elect27.htm
Indexed site with loads of references, theory, tube types, experiments and applications.

NOTED IN PASSING
Charles Bliley, K3NAU has recently updated his Bliley History website with more information: Biography of John M. Wolfskill, Chief engineer and Inventor, Talkie X-Tals, *QST* Bliley advertising and more. Great site to bookmark! *www.bliley.net/xtal/*

BY BILL FIZETTE, W2DGB

A Structured Approach to Fixing up Those Nice Old Radios

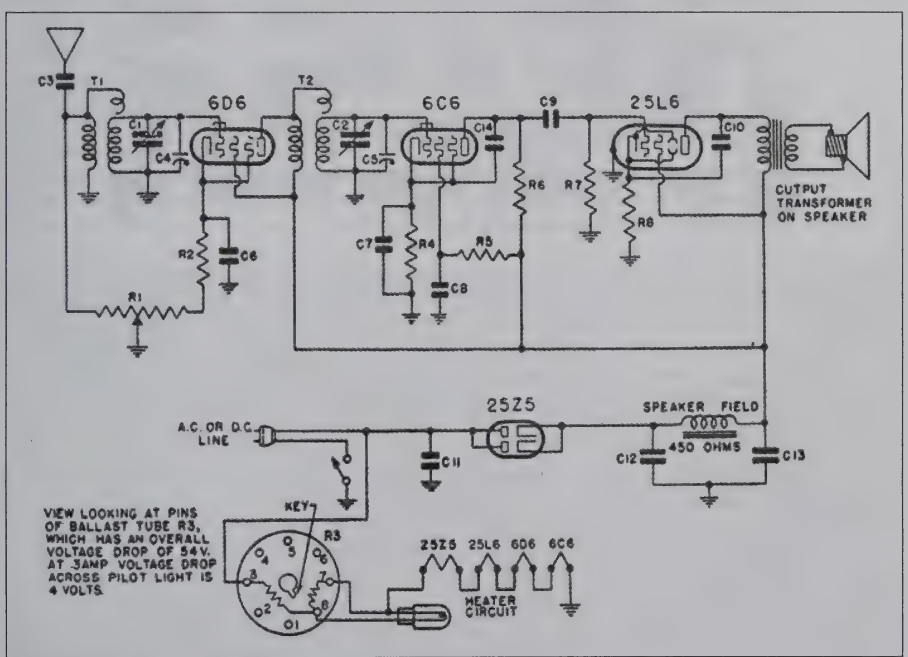
Repairing a Depression-Era Economy Radio Receiver

During most of the 1930s our country was very much in the grips of the Great Depression. There was very little free cash around for amenities like radios which, like the Atwater Kent products, had been expensive toys. However, a few manufacturers concluded that the consumer radio-receiver market was ripe for mass-produced low-priced sets, and set their goals accordingly. One company among many was Philco; another was Emerson. The decision proved to be a wise one.

The little set pictured here, a 1938 Emerson Model BA 201, has been in our family since it was bought in 1938, so there is a nostalgia motive for restoring it. The TRF (tuned radio frequency) circuit is simplicity itself, with four tubes, a plug-in ballast resistor, seven tubular capacitors and six ½-watt resistors. The power is from the AC mains and, as was common in the days before good permanent magnet speakers, the filter circuit used the speaker field as the smoothing choke.

One unusual design element is the placement of the volume control in the cathode of the RF tube, a type 6D6. It was common practice in the 20s and early 30s to put the gain control in the early stages, often in the primary of the antenna circuit. By 1938, with the superheterodyne rapidly becoming accepted design, the gain control had been moved

(continued on page 51)



Schematic of the little radio shows extreme simplicity of design.

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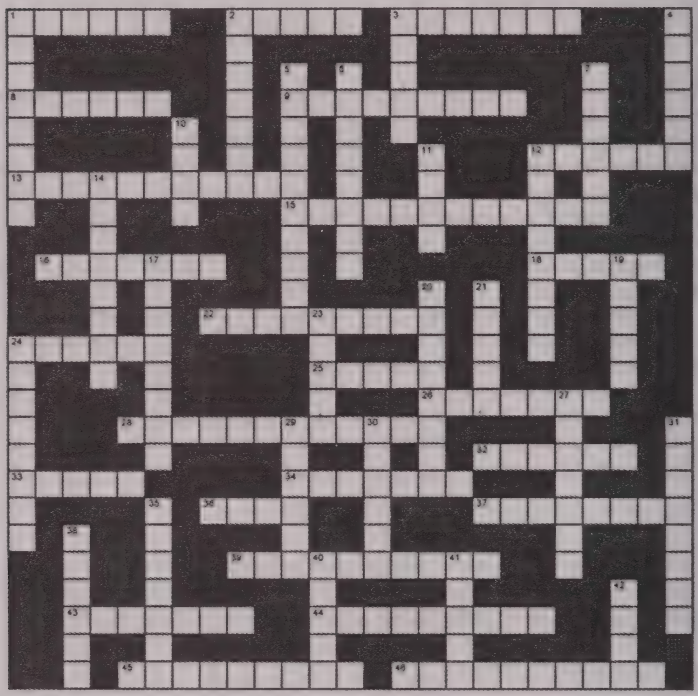
BY DAVID W. KRAEUTER

RADIO MEN: A BIGRAPHICAL CROSSWORD



(SOLUTION ON P.75)

ACROSS

1. He relied on cohesive force.
2. He had a lot of dash.
3. He gave us the "perikon."
8. He didn't vacillate, he flip-flopped.
9. Stay-at-home mathematician.
12. Probably least known of all.
13. Sometimes confused with Goldsmith.
15. Unshaven area or radio pioneer.
16. Some corporate chiefs or radiometer inventor.
18. Arco's teacher.
22. On one issue he remained neutral.
24. He saved half the signal.
25. KDKA pioneer.
26. Boss man.
28. He did it with great frequency.
32. Marconi mentor, letter expert.
33. He had little to do with elephants.
34. A dullard he wasn't.
36. Slaby's student.
37. Condenser man.
39. Sir Ernest.
43. He didn't vacillate, he oscillated.
44. Some things he wrote weren't true.
45. "Muscle" radio man.
46. Sarnoff's nemesis.

DOWN

1. Drink or antenna.
2. Was he British?
3. Line loader.
4. Also helped people eat.
5. Did *not* invent the Wheatstone bridge.
6. He thoriated tungsten.
7. Pittsburgh radio pioneer.
10. He got "Stoned" twice.
11. Dead ringer.

AUTHOR'S ADDRESS: 506 E. WHEELING ST., WASHINGTON, PA, 15301

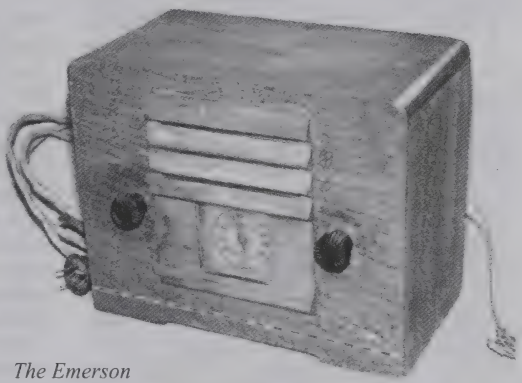
12. Often confused with Alexander.
14. His third was a charm.
17. Layer theorist.
19. Mechanical man.
20. Often confused with Benjamin.
21. Diagrammed radios, not sentences.
23. Rural building or British pioneer.
24. He oscillated too.
27. His valve discarded half the signal.
29. He had an eye for tubes.
30. Heavy metal or radio manufacturer.
31. Used icons before Gates.
35. Radio gave him direction.
38. British/American microphone developer.
40. He simplified tuning.
41. He still looks skyward.
42. Super man or radio manufacturer.

A STRUCTURED APPROACH, *continued from page page 49*

to the 2nd detector. However, many little TRF sets like this one still retained it near the antenna input.

Notice the hank of antenna wire in the picture. Later broadcast sets incorporated a loop antenna on the back of the set to eliminate this inconvenience.

The plug-in ballast "tube" is something we have not discussed in the past. On the schematic, you will note that the Emerson has a transformerless AC-DC circuit, with the tube filaments in series across the AC line. Since the tube filaments added up to 62 volts, a series resistor was required to increase the overall voltage drop to 115 (the nominal line voltage).



The Emerson BA 201 is an attractive example of a wood-cabinet depression radio.

In this case the ballast had an overall voltage drop of 54 volts at 0.3 amps. A tap was provided for a pilot light. Remember that the "All American Five" types of tubes, with filaments that added up to 115 volts, were not yet available or were not applicable to these very simple sets.

Another common means of dropping the line voltage for the filaments of these little radios was to use a "line cord resistor"— a filament string resistor incorporated into the line cord. More on this another time.

Inspection revealed that three of the tubular capacitors and the two-section electrolytic had been replaced in the past. No signs of distress such as burned resistors were noted, so using an isolation transformer, the set was powered up very slowly with my VTVM clipped across the B+ line.

Repeatedly turning the set on and off over a 15-minute time, and watching the B+ voltage, the electrolytics were gradually "reformed," until the voltage stabilized at slightly over 100 volts, per the service information. Without fanfare, the radio began to work. There were no signs of hum or other problems, even though most of the original parts were there.

We were fortunate with this service job in that the two components that would be difficult to replace: the speaker with the 450-ohm field coil, and the ballast tube, were still good. (There are ways to take care of these problems, but we will hold off discussion until the need arises.) The pilot lamp remained dark, and it proved too difficult to remove it without damaging the socket. Since it wasn't a significant part of the filament circuit, I left it alone. Finally, I touched up the RF alignment, even though it didn't really need to be done.

These little-mass market sets did much to encourage the growth of "radio" during the 1930s. With the international scene deteriorating towards a major world war, they at last provided a means for the lower-income households to hear the news, weather reports, and the fascinating entertainment offerings. The sets were reliable and could be serviced easily.

In due course many of these little AC-DC "cheapies" were designed with extra bands so that listeners could tune in on international short wave broadcasts. With the depression and a looming major war as a backdrop, along with the rapid growth of radio and aeronautics technologies, this was both a difficult and an exciting time to be alive!

EDITED BY **JOHN CASALE**, W2NI, 3 PICKERING LANE, TROY, NY 12180

Horace G. Martin

— Part Two: The Phillips System and the Autoplex —

In 1899, while still working for the New York Stock Exchange as a telegrapher, Horace Martin began experimenting with various automatic Morse transmitter designs. By 1900 he had established his first shop in New York City at 75 Nassau St., where he was listed as an electrician specializing in electrical instruments. He remained at this address for the next two years, while he worked as a telegrapher, doing contract work and building an electro-medical shock device designed to treat telegraphers who had lost their grip.

It appears that Martin also spent a fair amount of this time in an unsuccessful attempt at developing a Morse typewriter transmitter. It was stated at the time of his passing, and later by his son, Horace Jr., that his very first automatic transmitter design was not the Autoplex, but a "keyboard type — as large and cumbersome as a typewriter."

As of this writing, there is no evidence that Martin tried to introduce this transmitter commercially, or was associated with anyone else working on a similar type. But collectors may want to consider the possible existence of Martin prototypes.

After the United Press went bankrupt in 1897, Martin's former boss, Walter Phillips, went to work for the American Graphophone Company in New York. In 1902, Phillips was working at American Graphophone's factory in Bridgeport, Conn. as a superintendent of printing and recording expert. He recruited Martin to be his assistant and Martin relocated with his family to Bridgeport for the majority of that year.

In addition to their work as employees of American Graphophone, both Martin and Phillips were working on their own projects in automatic telegraphy. Phillips was promoting his system called the Phillips Morse Automatic Telegraph, jointly invented by Phillips and former United Press engineer Roderick Weiny. His system was considered an accelerated method of sending Morse by hand.

Phillips utilized Martin's mechanical talents, and his status as a well known telegrapher, to promote the Phillips system. The system consisted of an embosser, transmitter, and sounder all in an enclosure that resembled a graphophone, only without the horn. The sending operator, using a standard Morse key, would record his messages on an embossed tape. This tape was then fed into a transmitter that sent a group of messages at a high rate of speed over the line. The receiving operator had the same equipment and recorded the incoming messages on his embosser. He could then re-transmit the received messages to himself on his own local circuit, slowing the tape down to any speed he could copy.

In March of 1902 Martin traveled to Atlanta to act as a judge in The American Telegrapher's

The first storefront on the right is the site of Martin's first shop at 75 Nassau St. in New York City. Amazingly, today it is a Western Union agency.

Tournament. He also made a presentation demonstrating the Phillips Automatic system and used the system to record all the senders in the tournament. As a representative of the Columbia Phonograph Company, American Graphophone's sales agent, he awarded a phonograph to one of the winning telegraphers.

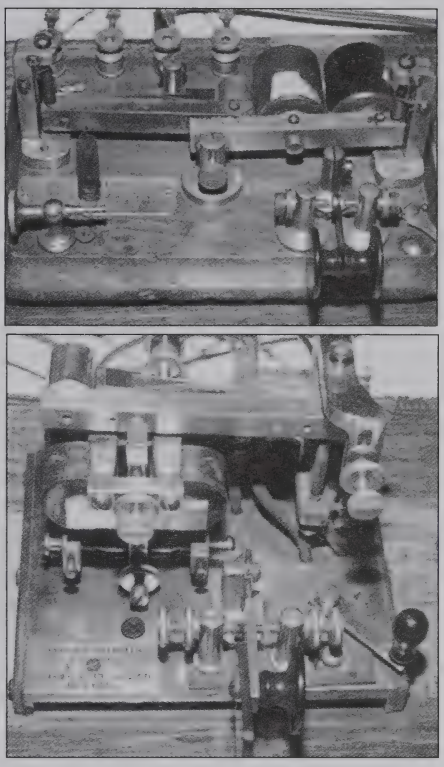
Later that month, Phillips recruited Fred Catlin to team up with Martin to promote the Phillips system. Catlin, aged 54, was a well respected telegrapher and a strong proponent of basing any automatic system on traditional Morse sending. Catlin's beliefs may have influenced young Martin's outlook on automatic telegraphy design.

During this period in Connecticut Martin was heavily involved with his own experiments, and it was while he was living at Bridgeport that his first successful transmitter was developed. "Having experimented for some time on automatic transmitters and having the occasion to observe the very interesting achievements of other workers in the automatic field. I decided that there was a demand for a small, simple and portable sending machine which, while being automatic or nearly so, would, as nearly as possible, retain the merits but not the demerits of the old Morse key."

The demerits Martin was referring to in this historic quote were the thousands of vertical key strokes a telegrapher was required to execute—frequently causing symptoms of "telegraphers' paralysis." The "merits" became the essence of Martin's key design philosophy and the template for all semi-automatic keys built in the future. There is a misconception that Martin designed his keys as "semi-automatic" solely to accommodate "American Morse," the telegraph code that included two characters with extended dash durations.

Martin's design philosophy remained unchanged throughout his career and he never mentioned any accommodation to a particular type of code. Beginning with his first patent, and with incredible foresight, he worked to retain the traditional control that a telegrapher had when using a standard Morse key. He wanted to ensure that the sending telegrapher kept his ability to "emphasize" any character at will, giving him the capability to adjust to fluctuating line conditions, adapt instantly to the receiving telegrapher's abilities, and to send different ways to multiple operators on the same circuit.

"This emphasis is accomplished almost entirely by lengthening or shortening the dashes and spaces"..... "These and kindred features have been the stronghold of the Morse key and the cause of the practical failure of all automatic transmitters heretofore devised." (And those that were developed thereafter.)



Two examples of the Autoplex built by Martin. The wood-based version is an early model made at 62 Cortlandt St. The other instrument is a UEM version from 53 Vesey St. From the collection of Gil Schlehman, K9WDY.

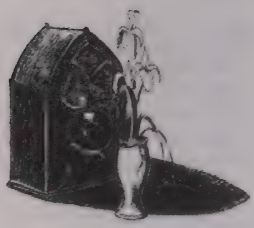
Martin's 1902 invention, the Autoplex, embodied these principles. He considered his invention "auto" or "nearly so" because it produced dots automatically but he kept the duration of the dashes and spaces up to the operator. The number of key strokes now required were considerably reduced and all horizontal.

The Martin Autoplex was a small, portable instrument that required one to two dry cells. The design was simple and its operation can be best understood by referring to the early wood-based version of the Autoplex. Look at the two horizontal levers running across the instrument. The one on the right is an armature, which makes an electrical connection to one on the left, a weighted pendulum, where they meet at the center.

When the operator moves the key lever to the

(continued on page 57)

RECENT RADIO, TV AND ENTERTAINER OBITUARIES



COMPILED BY **CHARLES S. GRIFFEN W1GYR**
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Note: When known, the date of death is indicated in parenthesis.

PETER BARTON, 51, (9-8-02) cable TV industry executive. Barton worked with John C. Malone to found Tele-Communications Inc. (TCI) which became one of the nation's largest cable operators. He joined TCI in 1982 and soon was involved in helping to create the home shopping channel *Cable Value Network* (now QVC) and was later named its President. In 1991 Mr. Malone decided to spin off TCI's cable programming investments from its cable systems into Liberty Media Corp. and appointed Barton as President and Chief Executive Officer. He left the company in 1997 to form his own investment firm and teach at the University of Denver.

WHITNEY BLAKE, 76, (9-28-02) actress. Blake played the role of Dorothy Baxter in the television comedy *Hazel* (NBC 1961-1965), a series based on *The Saturday Evening Post* cartoons of Ted Kay. She and her husband co-created *One Day at a Time* (CBS 1975-1984) for his boss, Norman Lear, which broke new ground dealing with complex issues of a working mother heading a household of two girls. Her other TV credits include regular appearances on *The David Frost Revue* (syndicated in the early 1970s) and dramatic anthologies such as *Playhouse 90* and the *Zane Grey Theater* and early episodes of *Maverick* and *Bonanza*. Blake's film credits include *My Gun Is Quick* (1957), *"-30"*- (1959) and *The Betsy* (1979).

RAY CONNIFF, 85, (10-12-02) bandleader and composer. The *Ray Conniff Orchestra and Singers* provided listeners during the 1950s and 1960s "with a mix of wordless vocal choruses and light orchestral accompaniment." He is credited with more than 100 recordings and produced 25 top albums for Columbia Records. Conniff won a Grammy Award for his recording of the Dr. Zhivago theme *Somewhere My Love*. Other of his compositions includes *Besame Mucho; New York, New York* and *S' Wonderful*. Conniff began his career playing trombone with *The Bunny Berigan Band* in 1937 and two years later joined Bob Crosby's *Bobcats in Hollywood*. He was also a trombonist and arranger for the Artie Shaw Orchestra and Vaughn Monroe Band.

KEENE CURTIS, 79, (10-13-02) actor. Curtis played Daddy Warbucks in *Annie* on Broadway and in San Francisco and Los Angeles. Other Broadway credits include *A Patriot for Me, Division Street, Night Watch and Via Galactica*. Curtis won a Tony Award in 1971 as best featured actor for playing four diverse characters in *The Rothschilds*. On television he played the role of the upstairs restaurant owner on *Cheers* (NBC) and was a cast member on *Amanda's* (ABC 1983), *The Magician* (NBC 1973-1974) and *One in a Million* (ABC 1980). Curtis also performed on *M*A*S*H, Touched by an Angel, Caroline in the City* and *ER*. Some of Curtis' film credits include *Heaven Can Wait, American Hot Wax* and *Richie Rich's Christmas Wish*. He was discovered in 1947 by Orson Wells who cast him in the film *Macbeth* (1948).

JOE DERISE, 76, (6-24-02) singer. Derise sang with the *Tommy Dorsey Band* and later performed with the *Claude Thornhill Orchestra* as a guitarist, singer and arranger. He left the orchestra to form his own group, *Four Jacks and a Jill*, which toured throughout the country. Curtis' jazz style was popular with audiences in cabarets like *The Ballroom* and *The Village Gate* in New York City. His last major performance was as a singer and pianist at the Algonquin Hotel in New York City in 1999.

TOM DOWD, 77, (10-27-02) recording engineer and producer. Dowd, a pioneer of stereo and multitrack tape recording, produced recordings which combined technical excellence and true creativity. He was an engineer or producer for many artists including John Coltrane, Ray Charles, Ben E. King, Derek and the Dominos, Eric Clapton and Otis Redding. Dowd was the Staff Engineer for Atlantic Records for 25 years and during the early 1950s encouraged the firm to move from acetate discs to audiotape and made some of the first commercial stereo recordings. He also purchased the second eight-track multitrack recorder ever made; Les Paul, the guitarist, had the first one. Dowd left Atlantic in the late 1960s to work as a freelance producer.

RAFAEL DRUAIN, 80, (9-6-02) violinist

and conductor. Druain served as the concertmaster for the New York Philharmonic (1971-1974), the Cleveland Orchestra (1960-1969), Minneapolis Symphony (now the Minnesota Orchestra) (1949-1960) and the Dallas Symphony (1947-1949). He appeared on many recordings with George Szell with whom he had worked at the Cleveland Orchestra and as a soloist. When he left the New York Philharmonic he devoted himself to conducting and teaching and made occasional appearances as a violin soloist.

GEOFFREY W.A. DUMMER, 93, (9-9-02) British scientist. Dummer predicted the development of the integrated circuit in a paper he presented at the IRE Symposium in Washington, DC on May 5, 1952. He came up with the idea of a microchip while working to improve the reliability of radar equipment after WWII. Seven years later an almost identical device was patented in the U.S. Dummer joined the Telecommunications Research Establishment (TRE) in 1939 to work in radar research. There he built the first Plan Position Indicator; a circular radar screen used to indicate the position of aircraft and began the Synthetic Trainer Design Group, which built simulators to provide pilots with radar experience without having to fly. Drummer retired from the TRE in 1966 to devote his time to consulting and writing. His many awards include the Member British Empire Medal and the United States Medal of Freedom.

N. THOMAS "TOM" EATON, JR., 86, (10-16-02) broadcast journalist. Eaton was appointed News Director for WTIC(AM) in Hartford in 1941 and remained there until the station expanded into television broadcasting in 1955. That year he was appointed News Director for WTIC's Channel 3. Eaton remained with the station when it was purchased by Post-Newsweek Stations in 1973 and the call letters changed to WFSB(TV). He retired from Channel 3 in 1985 and became a television licensing consultant. In 1946 he helped establish the Radio-Television News Directors Association and served as its President in 1953.

KAM FONG, 84, (10-18-02) actor. Kam Fong Chun (stage name Kam Fong) is probably best remembered for his role as Detective Chin Ho Kelly on the television series *Hawaii Five-0* (CBS 1968-1980). Chun left the show two years before it was cancelled because he felt the scripts were becoming stale. He was a Honolulu Police Department officer for 16 years before leaving the force in 1959 to become an actor.

CLIFF GORMAN, 65, (9-5-02) actor. Gorman won a Tony Award in 1972 for his role as Lenny Bruce in the Broadway play *Lenny*. In 1976 he won an Obie Award and gained fame for his portrayal of Emory in the off-broadway production of *The Boys in the Band*. Gorman also played the part in the 1970 film version. Some of his film appearances include Otto Preminger's *Rosebud* (1975), with Peter O'Toole and Richard Attenborough, Irwin Winkler's *Night and the City* (1992) with Robert De Niro and Jessica Lange and *The Way of the Samurai* (1999). Gorman's television credits include appearances playing Abbie Hoffman in a 1970 British program about the "Chicago Eight" trial and Law and Order; *Murder, She Wrote* (CBS) and *Police Story* (NBC).

ADOLPH GREEN, 87, (10-24-02) Broadway playwright. Green, in collaboration with Betty Comden, was co-author of numerous successful Broadway musicals including *On the Town* (1944), *Wonderful Town* (1953), *Bells Are Ringing* (1956), *Hallelujah, Baby!* (1967) and *Applause* (1970). The two also wrote the words for much of the Broadway show music written by Leonard Bernstein, Jule Styne, Cy Coleman, Andre Previn, Morton Gould and others. Some of the songs, such as *Make Someone Happy, Just in Time, The Party's Over; New York, New York* and *Lucky to Be Me*, became popular standards. "There was no other team that could match their quality and productivity..." over a six decade period. They began their careers as part of a nightclub act, *The Revuers*, in the 1930s.

LIONEL HAMPTON, 94, (8-31-02) jazz vibraphonist and bandleader. Hampton, who pioneered the use of the vibraphone as a jazz instrument, captivated audiences around the world with his energy and showmanship. He formed his first band in the mid-1930s, but left it to join *The Benny Goodman Quartet* in 1936. In 1940 Hampton assembled a second band which became very successful playing swing as well as early bebop and rhythm and blues renditions. By the mid-1960s musical tastes had changed and Hampton toured with an eight-piece combo known as *The Inner Circle*. In addition to playing the drums and piano, Hampton wrote over 200 songs including his signature piece *Flyin' Home, Midnight Sun*, written with Sonny Burke, and *Blues Suite*. He began his career with *The Les Hite Band* in Chicago while in his second year of high school and in 1928 rejoined them in Los Angeles. Hampton received many awards including the *Kennedy Center Lifetime Achievement Award* in 1992.

JONATHAN HARRIS, 87, (11-3-02) actor. Harris is perhaps best known for his role of the villainous Dr. Zachary Smith in the television science-fiction fantasy series *Lost in Space* (CBS

1965-1968). Other television credits include regular roles on *The Bill Dana Show* (NBC 1963-1965) and *The Third Man* (Syndicated 1959-1962) and guest appearances on *The General Electric Theater* (CBS), *The Twilight Zone* (CBS) and *Bewitched* (ABC). He appeared on stage with Marlon Brando and Paul Muni in *A Flag Is Born* (1946) and with Alan Ladd and James Mason in the movie *Botany Bay* (1953). Harris also did voiceovers for cartoons and animated films including *A Bug's Life* and *Toy Story II*.

RICHARD HARRIS, 72, (10-25-02) actor. Harris gained famed as King Arthur in the film version of *Camelot* and played Albus Dumbledore in last year's *Harry Potter and the Sorcerer's Stone*. He returned to the role in *Harry Potter and the Chamber of Secrets*, which opened in the fall of 2002. The Irish actor was nominated for best-actor Academy Awards for his roles in *This Sporting Life* (1963) and *The Field* (1990). He also appeared in *Unforgiven* (1992) and *Gladiator* (2000) which both received best-picture Oscars. After studying acting in London, Harris performed in the stage production of *The Quare Fellow* (1956) at the Theater Royal in Stratford. This followed with work on the London stage and eventually a contract with the Associated British Pictures Corporation. Harris made his first Hollywood appearance in *The Wreck of the Mary Deare* (1959) which starred Gary Cooper.

ARTHUR LORD, 60, (9-25-02) television journalist. Lord, an NBC News Producer, covered many of the major new stories of the past four decades. He joined NBC in 1966 as a news writer and producer and wrote for a number of the network's top anchors, including Chet Huntley, David Brinkley and Frank McGee. In 1971 he was sent to Saigon as an on-air correspondent to cover the war in Vietnam. After 18 months he was made Houston Bureau Chief, but returned to Saigon in 1975 as Bureau Chief. Lord headed NBC News' Burbank Bureau from 1979 to 1982. He remained there as Senior Producer coordinating coverage of special events from 1982 until his retirement in 1996. He received Emmy Awards for producing the news feature *Heart Transplant* in 1980 and as a writer for a special *Apollo to the Moon* in 1970.

WILLIAM D. "BILL" McCRAKEN, 73, (9-26-02) media executive. McCraken was Vice President and a Director of Frontier Broadcasting Co. and owner and operator of several radio stations, including Cheyenne's first cable firm, Cable Colorvision. He was also head of Cheyenne Newspapers, Inc. During McCraken's broadcasting career he helped build KRAL(AM) in Rawlings and was involved in getting Wyoming's first television station, KFBC(TV) on the air in the mid-1950s. He began working at his father's radio station, KFBC(AM), in Cheyenne when he was 13 years old.

NORMAN RACUSIN, 82, (4-29-02) recording executive. Racusin was a former President of RCA Records and an Executive Vice President of NBC. He worked with Elvis Presley and other popular vocalists and was instrumental in developing the eight-track tape. Earlier Racusin had been a Division Vice President and General Manager of RCA Records. He began his career with RCA in the accounting department in 1950. Racusin left RCA in 1970 to become Vice President of International Operations for the Reader's Digest Corp. and a member of its Board of Directors.

SEYMOUR REXITE, 91, (10-14-02) Yiddish vocalist. Rexite was a matinee idol of the 1940s and 1950s and with his wife, the singer and actress Miriam Kressyn, revolutionized Yiddish airwaves and stage by composing, performing and translating American popular tunes into Yiddish. At one point he starred on 18 half-hour radio programs a week. In New York City he was heard on WEVD(AM) and made guest appearances on WHN(AM)'s *Yiddish Melodies in Swing*. Rexite also created shows such as *The Barbasol Troubadour* for national sponsors. In addition to radio, Rexite was equally successful in the Yiddish theater, films, recordings and appearing in upscale New York nightclubs like *Billy Rose's Diamond Horseshoe* and the *Casino de Paris*.

KEITH UNCAPHER, 80, (10-10-02) network engineer. Uncapher was the co-founder of the Corporation for National Research Initiatives, a nonprofit group that conducts research into information infrastructure. In 1950 he joined the RAND Corporation and eventually became Director of its Computer Science Division. Uncapher was not only a capable engineer, but was a skillful manager able to attract talented people. An example was David Farber who in the 1960s conceived the fundamentals for handling and transmitting data, or packet switching. This became the foundation for Arpanet, a government-sponsored research network that preceded the Internet. In 1972 Uncapher left RAND to start the Information Sciences Institute at the University of Southern California. Their staff developed the Internet's domain name system, which included the suffixes .com, .net and .edu.

DON WELLS, 79, (10-3-02) sportscaster. Wells was the voice of the expansion *Los Ange-*

les Angels during their 1961 debut season and announced the first run hit by Angel player, Ted Kluszewski, on KMPC(AM). Other members of the original broadcast team included Bob Kelley and Steve Bailey. He was hired by Gene Autry, owner of the team, and Golden West Broadcasting Co. which, in turn, owned KMPC. In 1972 Wells joined KFWB(AM) where he announced sports and general news until his retirement in 1988. He began his career at WCFL(AM) in Chicago broadcasting White Sox and Chicago Cardinals football games.

Information for this column was obtained from *The American Musical Theatre, The Big Bands* (4th edition), *The Complete Directory to Prime Network TV Shows 1946-present* (4th ed.), *The Encyclopedia of Jazz* (1st ed.), *The Hartford Courant; On the Air: The Encyclopedia of Old-Time Radio,* www.broadcastingcable.com, www.hci.harvard.edu, www.netlondon.com, www.nytimes.com and www.yiddishradioproject. org.

Thanks to David W. Kraeuter, Frank Q. Newton, Jr., W6SYG; and Dr. A. David Wunsch for additional source material.

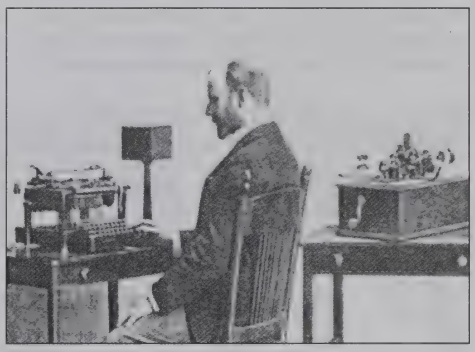
KEY AND TELEGRAPH, *continued from page 53*

right, current flows through the electromagnets attracting the armature. The armature kicks the pendulum towards the rear of the instrument, breaking its center connection and causing it to swing over to the far stationary contact—producing a dot. With the center connection now broken, the armature returns to its stop. The pendulum is returned by two springs, and reconnects the two levers. This whole sequence starts over again and will continue to produce dots until the operator releases the key. To produce a dash the operator simply holds the key lever to the left for the desired length of time.

In the Fall of 1902 Martin returned to Brooklyn with his wife and three children and on October 6th filed a patent on the Autoplex, his first telegraphic transmitter patent. He assigned one half of this patent to Walter Phillips, most likely as payback for the employment arrangement during the past year. Martin is the only inventor listed on the patent.

In 1903, Martin set up shop at 62 Cortlandt St in New York City and began to manufacture the Autoplex on his own. His involvement with the Phillips Automatic system continued and in fact, after the death of Roderick Weiny in 1903, Phillips began to rely even more on Martin's technical expertise. Martin seemed to take over Weiny's role, and was now being referred to as an "electrical engineer."

By 1904, it became necessary to take a more organized approach to the manufacture of the Autoplex. On February 17th, Martin, Walter Phillips, and a group of investors, many of them former telegraphers, formed The United Electrical Manufacturing Company. The Certificate of Incorporation listed four subscribers: Albert Brown, Lewis Young, Frank Schoonmaker, and G. Lee Stout. Start-up capital was stated as one thousand dollars.



A telegrapher using his "mill" to copy messages played back on the embossed tape of the Phillips Morse Automatic Telegraph System instrument on the table at right.

Martin was the fifth director out of the seven comprising UEM's board of directors for the first year's operation. Even though the company was formed for the manufacture of electrical and mechanical devices of all kinds, the primary product was initially the Autoplex. Martin's position with the company was vice president and general manager in charge of both sales and manufacturing.

The company's offices were at 25 Broad St. but the shop where Martin worked was at 53 Vesey St. In March of 1904, both Martin and Phillips traveled to the Louisiana Purchase Fair at St. Louis to exhibit both the Phillips Automatic system and the Martin Autoplex. At that time, the Phillips system was said to have been "greatly improved" by Martin and Phillips.

The third and final part of this article, "A Vibroplex in Every Telegraph Office," will appear in the next issue of The OTB.

BY PETER LANKSHEAR

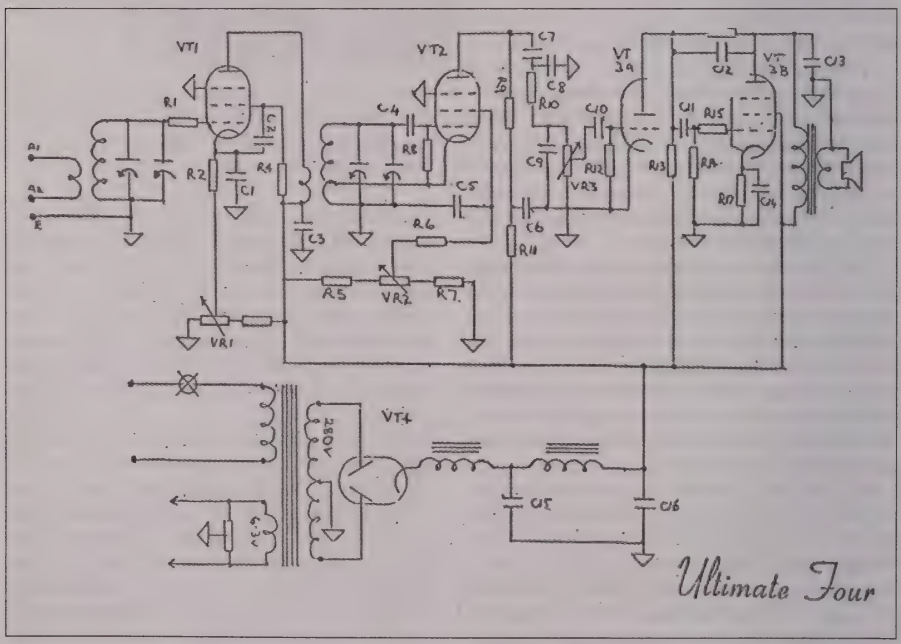
My Ultimate TRF: An Adventure into Nostalgia

In the very interesting article that follows, we've converted most of the "English" terminology to its American equivalents. However, we've allowed Peter to refer to his radio as a "TRF" since he uses the term so frequently. In this country the accepted terminology would be "regenerative" because the set certainly has a regenerative detector. In fact, its circuit is strongly reminiscent of classical "regen" sets such as the National SW-3 and the Pilot Super Wasp.—MFE

Before the advent of the screen grid tube in the late 1920s, the only practical amateur shortwave receiver consisted of a regenerative detector with one or two audio stages. Later, the isolation from the antenna provided by a screen grid r.f. stage was an improvement. By the mid 1930s, high performance superhets such as the National HRO and Hammarlund Comet Pro were available, but at a price that put them out of the reach of the average ham or SWL. For them the far more affordable home built regenerative grid leak detector receiver, with or without an RF stage, remained the workhorse. It was still capable of good results, especially with CW traffic, and some remarkable performances were achieved.

Commercially, regenerative receivers were used extensively in merchant marine and naval service. During the 1930s, expeditions to remote areas also often used them. Yet the TRF continued to offer simplicity and reliability.

One perhaps surprising use in the late 1930s was in the pre-war trans-Pacific China Clipper flying boats. the TRF sets were used both for traf-



Simple circuit has an RF amplifier, regenerative detector and two stages of audio amplification.

292 RACECOURSE RD., IVERCARGILL, NEW ZEALAND, PEEMEL@CLEAR.NET.NZ

fic and for direction finding [1]. Clearly Pam-Am could have afforded superhet receivers, but chose rather to build their own TRF regenerative receivers for this demanding service. Significantly though, Pan-Am relied on Morse transmissions. Had they used phone, I suspect that superhets would have been provided.

Another important TRF application came about during World War II when Britain first used its famous code breaking techniques for reading Germany's extensive radio communications. The code used for the Enigma cipher was transmitted in five letter groups and many of those transmissions were intercepted and copied on simple regenerative receivers.

I Build a TRF

In the late 1940s I built a TRF based on a 1930s *ARRL Amateur Handbook* design utilizing an RF stage, regenerative detector and two audio stages. This format was standard for TRF receivers which, other than using a pentode rather than a triode detector, were direct descendants of the ancestral RCA AR 1496 [2] and Pilot Super Wasp [3]. The result was a receiver that provided a lot of good listening, and I had a lot of fun DXing and being entertained by broadcasts from all over the World. However, before eventually retiring this receiver, I had become aware of some shortcomings in my methods of construction and I resolved that one day I would revisit the TRF.

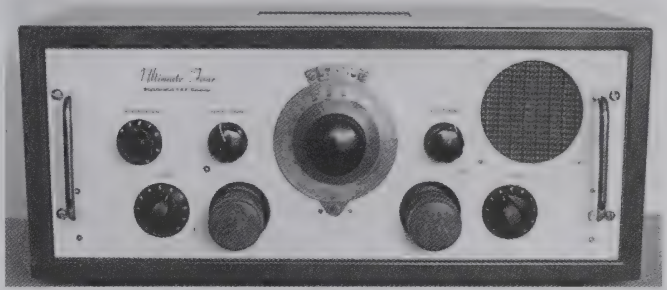
That project remained on the "back burner" with a very low flame for half a century, but recently it was revived, and the result can be seen in the photos. First though, there was a lot of planning and rejected ideas.

Previous experience had shown that for good tuning stability, solid construction was paramount and it would reduce the possibility of microphonics from the built in loudspeaker. The thin, easily worked metal typical of home constructed receivers, including mine, was out. Since die castings were an impossible ideal, I used heavy aluminium alloy sheet, settling for a 0.1" thickness for the chassis and shields, and a 0.2" alloy panel.

A cabinet which originally housed standard 19" width test equipment was available, permitting a roomy uncrowded layout. A good dial is essential and fortunately I had available a National type N "Velvet Vernier." These excellent dials were in the National catalogue for more than 20 years and were frequently found on small production-run professional equipment.

Efficient coils are vital, and switching can compromise short lead length and choice of coil diameter. Plug-in coils are the most efficient option, but climbing into a cabinet for changing them is a chore. Finally it all came together with front panel coil access providing ready changing and short leads. This coil system was borrowed from several commercial TRF receivers including the National 58C [4] and the British Royal Air Force R-1082.

In constructing the coils, I found that, by a fortunate stroke of luck, standard large 4 and 5 pin tube bases fit perfectly inside 1.5" O.D. plastic conduit. In turn, a 1.25" coil form fits nicely inside the tube bases. As can be seen in the photograph, with the addition of a turned wooden knob, these assemble into a very practical coil assembly.



Author says that all six knobs are required for optimum tuning! The handles that look like drawer pulls flanking the tuning knob and just below it are "pull-outs" for interchangeable coils.

The 1930s TRF receivers used first-generation pentodes of modest performance, but in later years a wide choice of higher performance tubes became available. The 9-pin noval series provides a wide selection of RF amplifier tubes. Possible choices for the RF stage and detector were the 6ES8, 6BX6, 6BY7, 6DA6, 6EH7 and 6EJ7, and by using the combined triode/pentode type 6GW8 a complete audio system would be possible with one tube.

After a lot of experimentation I concluded that the frame grid tubes 6EH7 and 6EJ7 were just too "hot" to tame in a traditional circuit and finally I settled on a 6DA6 RF stage and a 6BY7

grid leak detector with a 6GW8 two stage audio section. Detector operation is centred on the triode operation of the 6BY7 screen grid acting as an anode and is very dependent on voltage.

I was pleasantly surprised to find with only 20 volts of B plus, the transconductance between the control grid and screen of the 6BY7 is no less than 3000 micromhos. Only minimal feedback is necessary with this sort of performance, and regeneration can be brought in almost imperceptibly.

One of the weakest points of regenerative receivers is that the poor skirt selectivity is insufficient to eliminate strong adjacent signals and at the higher frequencies. These can "pull" the nearly oscillating detector away from the required station. I have the impression that the generally desirable very "soft" threshold of regeneration emphasises this problem.

Operating TRF receivers like this one separates the men from the boys and the six controls are all essential. The great strength of these detectors is their sensitivity and excellence for CW reception when regenerating. SSB can be resolved well, but takes time, which can be frustrating with short transmissions.

The solid construction has been vindicated as it has created a very stable set, with no hand effect or frequency drift. There is no detuning when the operating receiver is dropped from a height of several inches. The TRF is sensitive. For local medium wave reception, a foot of aerial wire provides plenty of pickup, and as I write, I am listening in New Zealand in the South Pacific to Germany's Deutche Weller Radio on 17mHz using length of about a yard.

Was the effort in building this set worthwhile? As a nostalgia binge, it was great fun, but as an operational receiver in competition with communications superhets in a crowded spectrum,

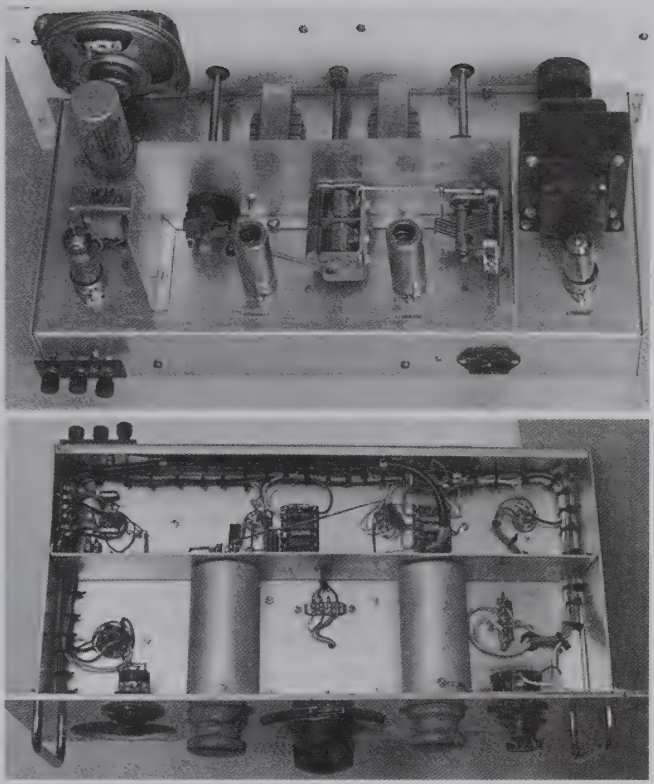
PARTS LIST

RESISTORS	CAPACITORS	VARIABLE RESISTORS
R1-27, 1/4 w	C1-.05 uFd, 100v	VR1-10k wirewound
R2-150, 1/2 w	C2-.01 uFd, 250v	VR2-5k wirewound
R3-56k, 1 w	C3-.068 uFd, 250v	VR3-1/2 meg log taper
R4-56k, 1 w	C4-.0001 uFd mica	
R5-39k, 2 w	C5- 0.1 uFd, 100v	
R6-47k, 1 w	C6-8 to 20 uFd, 350v, elect.*	
R7-1k, 1/2 w	C7-.01 uFd, 250v	
R8-2 meg., 1/4 w	C8-.0001 uFd mica	TUBES
R9-100k, 1 w	C9-.0001 uFd mica	
R10-47k, 1/4 w	C10-.01 uFd, 50v	VT 1-6DA6/EF89 or 6BA6
R11-10k, 1/2 w	C11-.01 uFd, 250v	VT 2 - 6BY7/EF85
R12-10 meg, 1/4 w	C12-.0001 uFd mica	VT 3a/b - 6GW8/ECL86
R13-220k, 1w	C13-.005 uFd, 400v	VT 4 - 6V4/EZ80 or 6X4
R14-470k, 1/4 w	C14-25 to 50 uFd, 16v, elect.	
R15-47k, 1/4 w	C15-16 to 50 uFd, 350v, elect.	
R16-1 meg, 1 w	C16-16 to 50 uFd, 350v, elect.	
R17-220, 1 w		

Capacitor working voltages are minimum values.
Unless stated, capacitors are polyester or ceramic.
Main tuning capacitor: 2 gang 450 mmf per section.
Tuning trimmers: 25 pf to 50 pf.

there is no contest. To provide equivalent stability a TRF has to be built to the same physical standard as a superhet and is in reality, no cheaper. It requires a lot of skill to "drive" and when receiving weak modulated signals in QRM, performance is inferior to that of a good superhet, although for CW it can hold its own.

To summarise, the TRF filled an important niche in the evolution of the communications receiver, but after 1945, its cost and simplicity advantages disappeared and consequently it has long been superseded by the superhet.



Solid mechanical construction and meticulous wiring are evident in these top and bottom views.

Circuit and Construction Notes

The antenna stage is a conventional RF amplifier, its gain controlled by potentiometer VR1. This stage isolates the detector from the aerial and provides some very useful gain. The detector has the traditional cathode feedback system that is really a Hartley and uses the screen grid as a plate, and which is grounded for both RF and AF by means of C5. The audio section uses a later-generation high gain tube (6GW8/ECL86).

As is obvious from the description, this receiver is a "one off" largely using recycled components from previous equipment. As no two junk boxes ever hold the same items, it is unlikely that anyone tempted to construct an "Ultimate Four" would be able to duplicate it exactly. However, scratch building is a good teacher, and is quite likely to improve on the original.

Chassis layout is governed by the coil shields being in the front, and with the tubes are in a single row at the rear. The original chassis is fairly large for a small receiver, but its dimensions were set by the standard 19" relay rack panel and cabinet.

The main tuning capacitor is a standard 450pF per section unit salvaged from a broadcast receiver, while the aerial trimmer and bandspread capacitors can be between 20 and 50pF. Before fitting these, make sure that their rotor grounding wipers are making good contact. Poor contact can be the source of erratic behaviour .

The underside partition fills three functions. It supports the coil bases, acts as a shield and gives the chassis extra rigidity. The exact position of the partition is governed by the length of the coil cans, and some care with measurements is essential. The cans are bolted to the chassis and the partition and, of course, clearance holes are punched for the coil sockets through the ends of the shields and the partition. Care should be taken to keep the coil sockets and associated tube sockets as close as possible.

I did not attempt to cut the holes in the front panel. A sheet metal shop used a fly cutter to do the job for me for a nominal sum, and at the same time they shaped the chassis in a power bender. Industrial powder coating is not essential but provides a very durable finish on panel and cabinet.

Keep the RF and detector grid and plate wiring direct and rigid. RF bypass capacitors

COIL DATA

	RANGE	FREQUENCY	R.F.STAGE		DETECTOR		
			pri	sec	pri	sec	tap
			turns	turns	turns	turns	frm bot
#1	500kHz -	1.6MHz	universal aerial replacement		universal RF replacement		4 turns
#2	1.5mHz -	5.0mHz	10	30	10	30	1.0 t
#3	4.5mHz -	14.5mHz	4	12	3	12	1.5 t
#4	7.0mHz -	22.0mHz	3	5	3	5	7/8 t

Range #1	see text.
Ranges #2,#3,#4	wound on 1¼"-dia. forms
Ranges #2,#3,#4	primaries 30 to 35 ga.; secondaries 20 ga.
Range #2	coils close wound
Range #3	secondary coils spaced to occupy 1.0"
Range #4	secondary coils spaced to occupy ½"
Range #2	aerial primary wound over a layer of cellulose tape at bottom of secondary
Range #3,4	aerial primaries interwound at bottom of secondaries
Ranges #2,#3,#4	detector primaries close wound ⅛" from bottom of secondaries

should be mounted on the tube sockets, and although the audio and power wiring is not critical, resistors and audio components can conveniently be on small component boards.

Bear in mind that since grid leak detectors amplify at audio frequencies, these receivers have a very high audio gain and consequently can have a hum problem. One-point audio grounding is recommended and can conveniently be at the filter capacitor can. A common source of hum is the ripple current from the power transformer high-voltage center tap roaming around the chassis, and this can be avoided by grounding the tap at the input filter capacitor.

The main high-voltage is about 240, but is not critical and can be anywhere down to 200 v. The power transformer was salvaged from a small receiver and has a 280-volt winding either side of the centre tap. As this would develop far too much high voltage with the rectifier cathode connected directly to the first filter capacitor, a choke input filter is an elegant way of disposing of the excess voltage.

A transformer with a 200-250 volt rating at 60 mA would be fine with a conventional capacitor input filter. Small filter choke(s) of around 400 ohms resistance would be suitable, and are mounted between the tuning capacitor shafts.

At one time plug-in coil forms were made commercially, but if these are not avalable, bases from ST12 bulbed tubes are fine and can be 4,5,or 6 pin to suit availability (although 4-pin bases cannot be used for the detector.) 1¼" forms fit well into these, and a smear of epoxy resin will fasten them firmly into place. Fasten turns in place with polystyrene cement, which can be made by dissolving foam packing chips in lacquer thinner.

Broadcast band coils (range #1) could be hand wound, but adjustable iron cored universal replacements are efficient and the high impedance primary windings simplify tracking. They are available from Antique Electronic Supply, Tempe Arizona. Note that the primaries are the larger of the windings. Instead of a grid winding tap, detector feedback is obtained by a few turns of fine wire wound between the primary and secondary windings and connected between cathode and ground. If there is no oscillation, swap the feedback winding connections.

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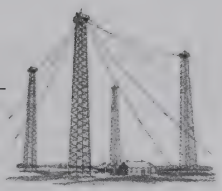
(1) "Pan Am Operations," *OTB* Vol 34, No.4, p.25
(2) "RCA AR1496," *OTB* Vol 30, No.1 p.36
(3) "Pilot Super Wasp," *OTB* Vol 11, No.3 p.16, *OTB* Vol 12, No.1 p.23
(4) AGS-58C Assembly *OTB* Vol 28, No.3 p.12

EDITED BY **FRANK LOTITO, K3DZ**, 1428 O'BLOCK RD., PITTSBURGH, PA 15239
PLEASE INCLUDE SASE FOR REPLY.



The Decremeter and Grid Dip Oscillator: VLF Through UHF

Part 3—Applications and Limitations

Applications of the Decremeter and GDO

We now know some basics about tuned circuit theory, how the decremeter and GDO are designed, how energy is coupled into these instruments, and a few clues on how to use the instruments as a RF source to excite passive tuned circuits. Let's explore some applications.

First, how was decrement of a spark transmitter measured? The basic formula for decrement, when using a decremeter, is given by:

$$\delta_1 + \delta_2 = \frac{1}{2} (C2 - C1) \pi \div C_r$$

where:

- δ_1 is the decrement of the circuit being measured
- δ_2 is the decrement of the wavemeter
- C_r is the capacity of the decremeter's tuning capacitor at the resonant wavelength (RF indicator indicates maximum RF)
- C2 is the capacity of the decremeter's tuning capacitor at a wavelength *greater than* the resonant wavelength where the RF indicator indicates ½ the current observed at the resonant wavelength.
- C1 is the capacity of the decremeter's tuning capacitor at a wavelength *less than* the resonant wavelength where the RF indicator indicates ½ the current observed at the resonant wavelength.

Notice the following:

1. The decremeter's decrement, δ_2. The lower this value, the more direct and more accurate the measurement becomes. This decrement must be known in order to use the instrument to measure a spark transmitter's decrement.

2. The user must have a means to relate dial rotation of the decremeter's variable capacitor to wavelength for each particular search coil used. This relationship, as well as the decremeter's decrement, δ_2, is usually in the form of calibration tabulation supplied by the decremeter's manufacturer.

The decremeter is set up close to the spark transmitter in a manner shown in Figure 6 [ref(1), figure 217]. The key of the transmitter is closed, and the transmitter adjusted for a clean and clear note (relatively speaking). The mechanical spacing between the wave meter's search coil and one-turn pickup loop L' is adjusted until the wavemeter's RF indicator reads a convenient value near full scale when the transmitter's resonant frequency is found.

The wavemeter's tuning is verified by slowly rotating the decremeter's tuning condenser to either side of what is presumed to be the resonant frequency of the transmitter. If indeed the resonant frequency was properly tuned, the wavemeter's dial setting, or C_r is recorded. Without

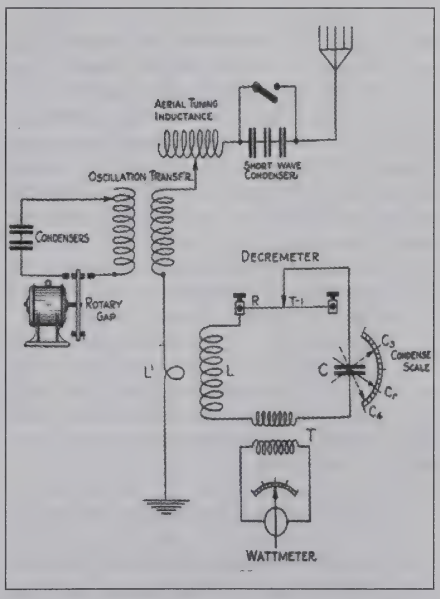


Fig. 6. Method of Coupling Decremeter to Spark Transmitter.

changing the wavemeter's coupling to the pickup loop, the wavemeter's dial is rotated up in capacitance to find C_2 and down in capacitance to find C_1. These values are also recorded. The three capacitance values and the decremeter's decrement δ_2 are plugged into the decrement equation, and the transmitter's decrement can be calculated.

You may have noticed R, T-1, and T in the decremeter portion of Figure 6. "T" is a means to transformer-couple a sample of the current that is circulating in the decremeter's LC circuit to a remote meter. "R" and "T-1" are used to determine the decrement of the decremeter. Refer to Section 170 of reference (1) for a discussion of how to perform the measurement and calculations for the decrement of a decremeter.

Figure 7 shows two forms of a hypothetical spark transmitter's resonance curve as it might have been obtained by "eyeball" estimate of the RF indicator's response as the decremeter's variable capacitor was slowly rotated through a large range on either side of C_r. Curve (a) is a normal response; (b) suggests an incorrectly adjusted transmitter, probably over coupled. The transmitter signal is very broad (high decrement) and very likely illegal!

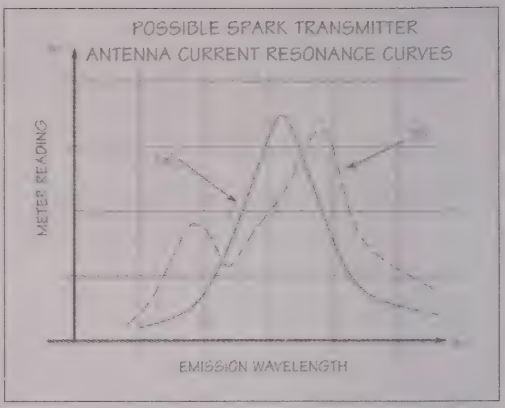


Fig. 7. Resonance Curves of a Hypothetical Spark Transmitter (a) Normal Curve (b) Transmitter Incorrectly Adjusted.

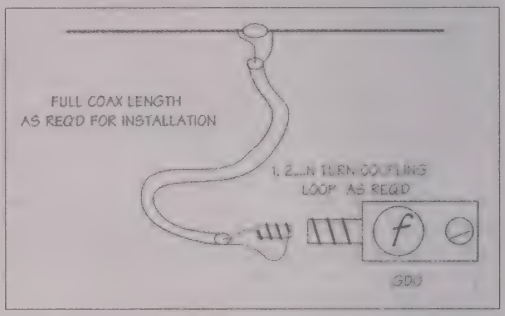


Fig. 8. Determining the Resonant Frequency of a Coax-Fed Dipole.

Moving on, let's see how we can use the decremeter or GDO to determine the resonant frequencies of a simple antenna, such as a half-wave Hertz (dipole). Figure 8 shows the test circuit. You must remember to start the scan well below the lowest frequency to be used and continue through a point well above the highest. This way you are sure to get information on all of the antenna's self-resonant frequencies that are of interest.

One last example: using a GDO to measure the self-resonant frequencies of a RF choke. Figure 9 illustrates how to search for both parallel and series mode frequencies.[4] The purpose of this measurement is to make sure that these frequencies are well above the intended operating frequency. Also, if multiband operation is intended, there should be no self-resonant modes at or in between any intended bands.

Decremeter And GDO Limitations

You may have noticed that both the decremeter and GDO are simple instruments. Neither has 3-figure accuracy. In the practical world of years past, and even today, many measurements are good enough to an accuracy of two significant figures. For some measurements, even one significant figure will suffice.

For example, in the pre-WWI era to about the mid-20s a spark transmitter decrement below 10 was definitely illegal. If the decrement was 20 or more, the transmitter was definitely legal. In the 50s, a GDO user dipping out his newly built 40-meter kilowatt AM transmitter's tank before applying power for the first time had no problems if the GDO frequency accuracy was only ±100 kHz. A dip someplace in the range of 6.9 to 7.4 MHz was usually good enough to verify that the plate circuit could tune the 40-meter band.

Let's look at a few sources of inaccuracy, many of which were common to both the decremeter and GDO:

1-DESIGN RELATED

(a.) Dial Accuracy. How large in diameter is the instrument's tunings dial and how finely divided are its graduations? Is there backlash in

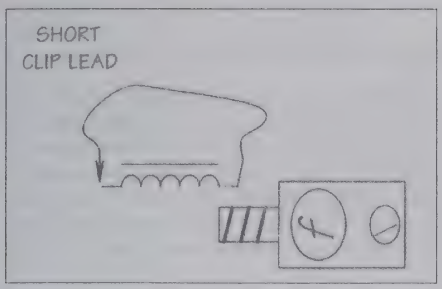


Fig. 9. Determining the Resonant Frequencies of an RF Choke

the tuning capacitor's bearings or vernier drive? One of the dial scales of the Eico 710 covers a range of 2.9 through 7.5 MHz, cramping the entire 40-meter band on the upper half of the dial with graduations in 500 kHz increments!

(b.)Type of Construction. Is the instrument kit-built like the Eico 710 or perhaps scratch-built? How accurate is calibration of wavelength/frequency/tuning capacitance value, and can that calibration be maintained for a reasonable using period of years? Will the instrument drift when set to a particular frequency? For a GDO, use of a good quality communications receiver to verify the dip frequency can significantly improve a measurement's accuracy.

(c.) Instrument Circuit Q. Extremely high Q (small decrement) LC circuits are theoretical. The actual Q or decrement of either instrument is moderate. RF emissions that are closely spaced may not be resolvable; for example, a RF amplifier's harmonic and a parasitic spur.

(d.) Testing Low Q Circuits. Coupling either decremeter or GDO to determine the resonant frequency of a low Q (high decrement) passive external circuit may not reveal the external circuit's natural resonant frequency. This is true if we attempt to dip-out the possibility of TPTG parasitic oscillations in a RF circuit using both grid and plate chokes, or examine the broadly resonant grid coil circuit of a TNT transmitter.

(e.) Physical Problems. Size of the decremeter or GDO's search coil may make application in circuits with small components (such as receivers) difficult, or even impossible.

(f.) Low search coil Q. Broadens the instrument's response in the same manner as a decremeter with a high decrement. Additionally, dips become more difficult to sense. A similar limitation is the case where the Q varies significantly over the range of the tuning capacitor for a particular search coil.

(g.) Harmonics. The high harmonic content of untuned mechanical vibrator exciters (as in Figure 4(a), can lead to incorrect determinations about the resonant wavelength of a passive circuit if the circuit can be tuned over a wide range.

2-USER RELATED

(a.) Overcoupling. One of the most prevalent problems in decremeter or GDO application is overcoupling the instrument's search coil to a passive circuit. From Part 1, we know that overcoupling runs the risk of broadening the resonant circuit's response, possibly even producing what appears to be two resonant frequencies! For a GDO in the oscillator mode, overcoupling will destroy the frequency calibration, or even stop the oscillator. Use as loose a coupling as possible. For a GDO, a tiny flicker at high sensitivity is far more accurate than a deep broad dip!

(b.) Physical Support. The GDO is a small hand-held instrument. Best accuracy is obtained when it is used with a RF- transparent support (such as a block of wood) so that the coupling remains constant during the measurement. For example, when dipping out a choke or coil's self-resonant frequencies, rest the GDO on a wooden work bench, and lay the choke or coil being dipped next to the GDO's search coil. Decremeter application must also follow similar rules.

(c.) Technical Misunderstanding. Lack of understanding about how to properly couple to a resonant circuit can cause misleading results. For example, grounding a half-wave end-fed antenna through a sampling coil that is loose-coupled to the GDO sampling coil yields as the lowest resonant frequency something akin that of a ¼-wave (current feed) wire's self resonant frequency. This is roughly ½ the self-resonant frequency of an end-fed wire. The user may spin his wheels for hours wondering what happened. Another typical error is that of coupling a GDO to the input of an antenna tuner in order to trim a dipole to the best correct length. The presence of the antenna tuner will disguise the antenna's resonant frequency. A dip will be found at the tuner's input terminals even if the antenna feed line is shorted out!

A Word Of Caution

Tinkering with RF power amplifiers and GDOs can be lethal! Be very careful when buzzing out your RF power amplifier. Is the high voltage off? That also goes for the 10 watt OT transmitter, or even a tube type radio receiver. Obviously making decremeter or GDO measurements mean you have to get up close to the equipment. You may be exposed to dangerous

(continued on page 67)

About Our Authors

HENRY M. BRADFORD
Did Marconi Receive Transatlantic Radio Signals in 1901?

Henry's high-school interest in radio led him to college studies in physics, and he eventually became a Ph.D. in solar radio astronomy. His interest in early radio began after learning of the three Marconi Station sites at Cape Breton, Nova Scotia, where he was teaching. (See his articles: "Celebration of 100 Years of Radio in Cape Breton," *The OTB*, Vol 36, No 4," "Marconi's Three Transatlantic Radio Stations In Cape Breton," *Journal of the Royal Nova Scotia Historical Society, Vol 1/98*, the two-part article "The Cape Breton Stations of the Marconi Transatlantic Radio Service" that appeared in earlier "Below 535" columns [*The OTB* Vol 41, Nos. 3 and 4] and another "Below 535" article [*The OTB* Vol 42, No. 3] "The Marconi Transatlantic Wireless Receiving Station at Louisbourg, Nova Scotia, Canada").

JIM HANLON, W8KGI
The Echophone Commercial Model EC-1
(In "The Communication Receiver")

Jim was born in Cincinnati in 1938 and first licensed as WN4VIV from Fort Thomas, KY in 1952. Jim earned BEE, MS and Ph.D. degrees in Electrical Engineering from The Ohio State University where he also taught EE for four years. He worked for Bell Telephone Laboratories for 25 years and transferred to Sandia National Laboratories in Albuquerque where he is currently a Principal Member of Technical Staff. Jim is one of the sponsors of the "Classic Exchange" old-time equipment contest, and at any given time he has about two dozen transmitters and receivers ready to go on the air. Jim is a member of the ARRL, QCWA and AWA, and he has had many articles published in *Electric Radio* magazine.

DR. HUGO HOLDEN, BHB, MBChB, FRACO
Restoring a HMV 904 — Part 1
(In "Television")

Hugo is a New Zealand trained Doctor and Ophthalmologist, currently practicing his specialty on the sunshine coast in sunny Queensland, Australia. He started out in electronics engineering, and often visited the late John Stokes' radio shop as a boy. It was close to the home where he grew up in New Zealand. Dr Holden changed to medicine in the early 1980s. Keen on vintage electronics, he has collected a number of interesting items, ranging from pre-war television sets, to germanium transistor communications receivers of the 1960s along with some early TTL equipment from the 1970s.

DAVID W. KRAEUTER
Radio Men: A Bigraphical Crossword

David Kraeuter was born in Homestead, PA in 1941. He holds an M.L.S. degree from the University of Pittsburgh. He has edited the Pittsburgh Oscillator and the monograph series of the Pittsburgh Antique Radio Society. Currently, David writes the book review column for *The OTB*. Since the 1980s he has been interested in making the vast wealth of information buried in national patent publications more accessible to the public. He thinks he has made a beginning in this work with his latest book, Radio Patent Lists and Index, 1830-1980, published by the Edwin Mellen Press. In 620 pages, the book tabulates and indexes 6,200 U.S. and British patents issued to 100 radio and television inventors. David is also working with radar pioneer and writer G. W. A. Dummer of the UK on the 5th edition of *Electronic Inventions and Discoveries*, a chronology of electronic firsts from the 17th century to today.

PETER LANKSHEAR
My Ultimate TRF: An Adventure into Nostalgia.

Peter Lankshear became interested in electronics at a very early age. While still at college he worked as an operator 3 nights a week at small local radio station. Afterwards, he joined the New Zealand Broadcasting Service, where he spent 42 enjoyable years, retiring in 1988. His work experience included installation and operation of radio studios as well as broadcast and television transmitters. During the decade before his retirement, he was Broadcasting and Television Transmission Superintendent for Southern New Zealand.

Peter is a Registered Engineering Associate in Electronics and for about 10 years he conducted the monthly Vintage Radio section in *Electronics Australia*, at the time the largest circulation radio magazine in the Southern Hemi-

sphere. He regularly writes articles for the New Zealand Vintage Radio Society's *Bulletin*, the Historic Radio Society of Australia's *Radio Waves*, and two British publications: *Radio Bygones* magazine and the Eddystone User Group's *Lighthouse*. He is a life member of the New Zealand Vintage Radio Society and the Historic Radio Society of Australia.

NEAL McEWEN, K5RW
Victorian Era Visual Signalling Instruments

Neal was born in North Texas and has lived there all his life. He took an interest in radio at an early age, when a grammar school friend showed him a crystal set. This eventually led to an amateur license in 1960. In 1977 he traded K5ZJP for his current callsign, K5RW. Neal's amateur activities consist of 99% CW on 40, 20 and 15 meters.

He holds a B.S. degree in Mathematics and works in the Information Systems department of a large telecommunications manufacturer. For the last 20 years, Neal has had a keen interest in collecting wire and wireless telegraph keys and related apparatus and artifacts. He also maintains a library of resource material on telegraphy from the 1860s forward. He has been the guest editor for the "Key and Telegraph" column on two previous occasions.

Neal maintains a web page on a broad range of subjects for key collectors and historians. Called the "Telegraph Office," you can visit it at http://www.metronet.com/~nmcewen/tel_off.html.

BELOW 535, *continued from page 65*

voltages while distracted by interpreting your results, all the while holding a conductive probe in your hands. Be careful!

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(5) Gibson, H. L., *Test Equipment For The Radio Amateur*, pages Section 3, pages 3.1-3.19, Radio Society Of Great Britain, Second Edition, 1978.
(6) *The Radio Amateur's Handbook*, Sixty-Fourth Edition, pages 25.22-25.26, Amateur Radio Relay League, Newington, CT, 1987

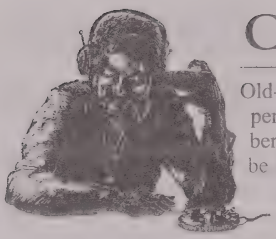
[1]The GDO (Grid-Dip Oscillator) is frequently referred by other names. For example, in the literature as the "Dip-Oscillator," and colloquially by some amateurs as a "dipper" or "grid-dipper."

[2]For example, grid-cathode detection in the manner employed by designs spanning decades of grid-leak detection as used in low cost, and alas, low performance, AM radio receivers.

[3]Both the decremeter and GDOs are supplied with plug-in coil sets. This allows the instrument's tuning capacitor to work with the variety of coils to tune a wide range of frequencies while attempting to maintain a high "Q" (low decrement) of the instrument's tuning circuit. These coils are commonly referred to as search coils.

[4]All chokes and all RF coils have one or more pronounced self-resonant frequencies. This is due to the stray capacitance between the turns, and across the choke or coil's terminals. These strays may be different if the choke or coil is tested "out in the open," or in-situ, i.e., mounted on the chassis and connected to the circuit. Someone may wish to author an *OTB* article more thoroughly addressing self-resonance in RF chokes and coils.

[5]Some spark transmitter models had a "built-in" decremeter. So long as the mechanical geometry of the decremeter's search coil/coupling loop remained constant, it was possible to calibrate the decremeter's indicator in terms of power or antenna current.



Classified Ads

Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551**.

IMPORTANT!

OTB classified ads are now available for browsing in the "*OTB On Line Edition*" on our internet web site (www.antiquewireless.org). This practice will give members dramatically increased exposure for their ads.

SELL/TRADE—BC/SW TUBE RADIOS

Zenith Trans-Oceanics, all models available except military call; RCA 56X5 BC/SW wood table radio, working, $85.; Hallicrafters, SW-500, S38E, both working, $60. each; TW-1000, needs work, as-is, cabinet good, $100. Ted Demski, 5806-225 Place S.W., Mountain Lake, WA 98043-3728 (425) 778-7100

Atwater Kent Model 12 Breadboard (#4910), all there, both tags, nice!, $1325.; Atwater Kent Model 310 console (6-legs), complete except for hanging speaker, $195.; Kennedy Model 525 two-tube amplifier, (St. Louis), cleaned-up nice!, $850.; RCA Radiola Sr., near mint! With display WD-11, $315.; Federal 61, immaculate! With all tubes, $1550.; Majestic 15 tombstone, nice working condition, $195. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, Cape Cod, MA 02649 (508) 477-1578 E-mail: radio-1@attbi.com

RCA98K with electric tuning. Looks good, needs restoration, $100.; AK55 console, working, $130.; two extra Model 55 chassis, good working condition, $90 each; AK 612 chassis, their best in 1932, fine condition, $200.; Philco 65, one of their earliest consoles, good looking, restored with new capacitor and other parts, $160.; Philco 650, good looking but needs restoration, $100. Malcolm Burdick, W1NOD, 156 Station Rd., Hampton, CT 06247 (860) 455-9640 before 8 p.m. please

Stewart Warner #325, Freed-Eisemann FE15, Atwater Kent #42, Freshman Masterpiece #28788, very good to excellent condition. Sell as one lot. Also have Hallicrafters SX100, SX101A in very good condition. R. Truhlar, W9LNQ, 1701 W. 101st Street, Chicago, IL 60643 (773) 238-0544

SELL/TRADE—COMMUNICATIONS GEAR

1kW professional broadcast AM transmitter, Raytheon RA-1000 in good condition, disassembled. Enclosure 4 5 5 5 7 feet, with all tubes, transformers. Perfect for 160 or higher, $400. Charles Graham, K2GVE, 4 Fieldwood Drive, Bedford Hills, NY 10507 (914) 666-4523

U.S. Forest Service radio model "SX". Have classic communications gear and telegraph keys to trade, or cash. Rick Ferranti, WA6NCX, 1341 Cedar Street, San Carlos, CA 94070-4757 or E-mail: remler@juno.com

General Electric aircraft transmitter, Model Type AS-1B with case, $45. OBO, Carl Goatcher, W0HRL, 35 James River Road, Kimberling City, MO 65686 (417) 739-2515

Drake receiver Model 1A, with calibrator and internal speaker, manual. Good physical and electrical condition, US $200. Des Wright, 3 Tamatea Drive, Snells Beach 1240, New Zealand

National NC-183, with speaker, excellent!, $450.; National NBS-2 excellent condition,

$450.; Hallicrafters S-40B, $75.; Hallicrafters S-38C, fair cond., $50.; Hallicrafters S-120, needs tune-up, $50.; Hallicrafters SX-42, nice, $340.; Zenith H-500, TransOceanic, $125.; Zenith A-600 TransOceanic, $125.; RCA 3BX-7651, high-end leather portable, (like T/O), $195.; Heathkit HR-1680, with speaker, $150.; Heathkit HR-1681, $100. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, Cape Cod, MA 02649, (508) 477-1578 E-mail: radio-1@attbi.com

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RMCA VLF receiver, 15-600 kHz, with instruction manual, weight 29 lbs., Navy Model RAZ, working order, $50. Guy P. Allen, W3RLA, 7 Hilldale Circle, Lansdowne, PA 19050-2308

SELL/TRADE—GENERAL

1924 Burns Model 205B flower speaker in mint condition, $225. Ronald Graves, 3120 N 72 Way, Hollywood, FL 33024-2423 (954) 964-2063

Four military turns (30) counters, $30. each; 20 doorknob capacitors, 15KV, $5. each; carbon non-inductive, 50 ohms, 5KW loads, $50.; Jerrold UHF preamp, 806-890 MHz for tower mounting (brand new), $50.; Heath QF-1 Q Multiplier, $15.; Barber-Colman 310 potentiometer (without case), with manual, $50.; Sencor Big Mack Universal CRT tester (mint), $50.; Sencor Super Cricket Transistor Tester (mint), $50.; Roberts 990 (2-4 tracks) stereo reel to reel professional tape recorder (copy of Ampex AG-600), mint-like new, $400. Francis Yonker, W2IBH, 1229 Inverary Place, State College, PA 16801, (814) 867-1400 E-mail: Yonker1229@adelphia.net

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Radio and TV test equipment, BC348, BC221, Bear Cat 4, 101, variable capacitors, coils, power transformers, audio transformers, chokes. Local pickup preferred. Alan Mark, P.O. Box 372, Pembroke, MA 02359

RCA Strato-World, good condition, works, $100.; RCA 8T tombstone works, good condition, $150., Terry Adelwerth, 145 Brookfield Ave., Center Moriches, NY 11934

Microphone collection. There are fourteen microphones in the collection. Two are on a spring holder & one extra microphone holder. One microphone has three holders broken off. They look like white metal, but all the guts are there. There are Western Electric, Sure, American Micro, Lifetime, Crystal Micro, Turner, Dynamic, & Astatic Microphones. For trade for unusual telephones or parts. Can send photos. Norm Mulvey, 310 Thorntree Lane, Canton, GA (770) 844-6277 E-mail:normstele@aol.com

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Western Electric amplifiers. Good clean working condition, all original, $350. Pickup only. Paul Recupero, 265 Union St., Portsmouth, RI 02871-2264

Ozarka "4-dial (1922), complete with all tubes, looks great, $185.; FADA 175A Neutrodyne, (1924), slant front, with all tubes, immaculate inside & out, $155.; Adler Royal (Silvertone, 1924), excellent condition with all tubes, $155; RCA Radiola 25, solid cabinet, with all 8 type 199 tubes!, $185.; Philco 37-610 tombstone, (1937), solid cabinet, working, nice, $110.; Majestic 151 "Havenwood" tombstone (1932)in clean working set, $185.; Drake SPR-4, excellent, $285; National NC-183 with original speaker, nice, working, $325; McKay Lifeboat emergency radio, unique, with canvas cover, $185. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, Cape Cod, MA 02649 (508) 477-1578 E-mail: radio-1@ attbi.com

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Have too much stuff. Send two stamp SASE or E-mail for my list of tubes and parts, etc. Lots of old tubes and books. Wayne Letourneau, P.O. Box 62, Wannaska, MN 56761 E-mail: letourneau@wiktel.com

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Morse Code Records, Navy Training aids, NavPers 11025RB, 78 rpm, 1951, never used, 10 inch; Jerrold Pre-Amplifier, 806-890 mHz, tower mount, new, in original packing; Barber-Coleman Laboratory potentiometer, Model 310, measures DC output of thermocouples (0-65 millivolts); Sencor Cathode Ray Tube Tester-Rejuvenator, with 16 adapters, new never used; Dynamotors, high voltage for transmitters; Capacitors-air variable, vacuum, mica, oil, doorknob; headsets; Montgomery-Ward 3 cell 1936 flashlight; assorted transformers for transmitters; noninductive loads, rectifiers and blowers. Francis Yonker, 1229 Inverary Place, State College, PA 16801-6454

German WWII telegraph key, excellent condition, in bakelite case; Japanese WWII transceiver in leather case with built-in key, antennas, earphones, throat mike and hand crank generator, in excellent condition. Best offer. Ron Graves, 3120 N 72 Way, Hollywood, FL 33024

CRT JAN 5FP7 I.O.B, $10.; EICO 324 Sig. Gen., $25.; Heathkit IG-52 Mark-Osc., $25.;

Grundig KS732U, $75. (No shipping); Fisher Scientific Relay, $10. Add shipping costs. Robert Rossi, 10936 Melbourne St., Allen Park, MI 48101 (313) 386-8321

Fada 175A, $150.; Freed-Eisemann NR-7, $125.; AK variometer, $65., all in good condition. Terry Adelwerth, 145 Brookfield Ave., Center Moriches, NY 11934 (631) 878-6978 E-mail: terrya@ieaccess.net

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James Millen antenna matching preamplifier 92101 with 27-32 MHz plug-in, $25. plus 4 lbs. shipping. John Uscinowski, KE20, 95 Vly Summit Road, Greenwich, NY 12834-9519

SELL/TRADE—KEY & TELEGRAPH

Vibroplex speed key, #270755, gold colored, name label on top surface, very good condition. William Bell, Box 20, 1314 E. Los Olas Blvd., Fort Lauderdale, FL 33301

SELL/TRADE—LITERATURE

Book "From Immigrant To Inventor" by Michael Pupin, 1923, $20. plus UPS. John Uscinowski, KE20, 95 Vly Summit Rd., Greenwich, NY 12834-9519

The Radio Handbooks, #7, 18 and 20. All are in good condition. Also Semiconductor Fundamentals by General Electric, Motorola, National, Fairchild, Westinghouse, and RCA. Astron power supply Model RS35M in excellent condition. Barney Moffatt, W5CJZ, 5714 Trail Meadow Drive, Dallas, TX 75230

"Beitman's Most Needed Diagrams" 1926-1953 (13 Volumes) plus 1500 vacuums tube data sheets plus various related articles (Mil Spec. for tube testing, 1937 RCA tube manual). All on one CDROM, $11 plus $1.50 for first class mail. Tom Bavis, 3 Euclid Drive, Macedon, NY 14502 E-mail:tbavis@rochester.rr.com

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WurliTzer radio booklet. History of WurliTzer radio from 1924-1937. 60 pages, 67 pictures, 24 in color. 24 schematic diagrams. Lyric radio. The association with All American Mohawk. Unusual radios built by WurliTzer. More. $8.95 including S&H. Larry Babcock, 8095 Centre Lane, East Amherst, NY 14051 E-mail: dotlarryb@aol.com

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First user friendly circuit on early BC-348s. Send $4. plus SASE (#10 envelope) to Ray Larson, 12241 1/2 Gorham Ave., W. Los Angeles, CA 90049-5214

The following books: From Immigrant to Inventor by Michael Pupin, 1930 reprint, $15.; General Radio Catalog, 1950, $10.; Saga of the Vacuum Tube, Sams, 1977, $10. All plus shipping. J. Feasel, 13549 Morse Rd., SW, Pataskals, OH 43062-9319 (740) 927-2592

Federal Tel & Tel 1921 catalog of radio products. Repro copy. 26 pages, 8" 5 10". With price list. This was about Federal's first year in the radio field and there are some interesting items to see. $10.00 includes S&H. Send to Larry Babcock, 8095 Centre Lane, East Amherst, NY 14051 E-mail: DOTLARRYB@AOL.COM

SELL/TRADE—MILITARY

Walkie talkies, 1 pr. each, BC-611, and PRC 6, $100. per pair; Test Set ID-292/PRC 6, $20.; DF Antenna AT-249, $20.; 20 Rolls Teletype paper, $2. per roll; 2 CRTs 5BGP2A, $25. Each; 1 CRT #T51P2A, $25.; 1-2BP1 CRT, $10. Leland Winfrey, 1121 Butler Ave., Lincoln, NE 68521

SELL/TRADE—PARTS

Radio tubes, tested, used. Also galena radios and crystal radio parts. Free list. Len Gardner, 458 Two Mile Creek Road, Tonawanda, NY 14150-6610

Great selection of Film and Electrolytic Capacitors in the high voltage sizes needed for tube radio restorations. For capacitor price list & product info please write Dave Cantelon, 42 Clematis Dlr., North York, Ontario, Canada M2J 4X2 (416) 502-9128 E-mail: justradios@yahoo.com website: www.justradios.com

SELL/TRADE—TEST GEAR

U.S. Navy SG-85 Signal Generator, with manual, clean, $200. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, Cape Cod, MA 02649 (508) 477-1578 E-mail: radio-1@attbi.com

SELL/TRADE—TUBES & TRANSISTORS

Used radio tubes, all guaranteed. Have limited supply of each. 5U4GB, 6SN7GT, 12AT7, 12AV7, 24A, $2.50 each. 6A6G, 6A8G, 6Y6G, 25Z5, 43, 78, $1.75 each. Please allow for postage. Herman Fothe, 5292 Tiffany Ann, West Palm Beach, FL 33417 (561) 688-2792

WANTED—COMMUNICATIONS GEAR

Early aviation radios, civil & military, U. S. &

foreign, in condition suitable for exhibit at Museum. Radios such as (but not limited to): Airadio, ARC, Bendix, Collins, General Electric, Hallicrafters, King, Lear, Marconi, Motorola, Narco, RCA, U.S. Army Air Corps, Western Electric and Zenith. Also, test equipment related to aviation radio. C. Bart Whitehouse, Avionics & Wireless Curator, Wings Over Rockies Air Museum, 7711 E. Academy Blvd., Denver, CO 80230 (303) 781-4177

Browning transmitter Model T2700 or Model S9. Robert Martin, 111 Bancroft, Rochester, NY 14616 (585) 663-4182

Bandspread and main tuning dial for a RME-70 receiver. Richard Petersen, 1940 Grand Ave., Marion, IA 52302-5013 (319) 377-9126 E-mail: dottielee526@juno.com

WANTED—GENERAL

Sparton Models 6218 and 7140 radios; chassis and speaker for an Emerson "Wheat" Model 414 radio; chassis for a Stromberg Carlson 240H radio; a blue jeweled LED light for the shortwave band on an Emerson Model BD-197 radio. Joseph DiCaro, 4155 Lastada Heights, Mississauga, Ontario, L5C-3V1, Canada (905) 848-7759 E-mail: decoradio@ primus.ca

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Want 7" and 8" TV sets from the late 1940s such as National, Admiral, Silvertone, Teletone, Motorola, RCA Crosley and others. Thanks. Charles Harper, 2000 Jackstown Road, Paris, KY 40361 (859) 484-9393 E-mail:charper@kyk.net

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EICO 3200 SS tuner, 3566 or 3570 receivers; Fisher TA-500 receiver, FM-80. Jerry Talbott, 1440 SW 239th Ave., Hillsboro, OR 97123-7640 (503) 649-6717 E-mail: jerry@easystreet.com

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Want to purchase an Emerson 545 TV set. Also need a 7JP4 CRT, and any 7 inch TV sets. Thanks. Charles Harper, 2000 Jackstown Road, Paris, KY 40361 (859) 484-9393 E-mail: charper@kyk.net

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Reproduction operating instruction card for Grebe Syncrophase MU-1. Fits the inside back of cabinet. Also chassis for Lyric Model S-6 table radio. James S. Fisher, RR, Box 861, Port Royal, PA 17082 (717) 527-2224 E-mail: yrless@tricountyi.net

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Anything by David Grimes: radios, advertising, ephemera, stories, literature, references. Mike Grimes, K5MLG, 3805 Appomattox Circle, Plano, TX 75023 (972) 867-6373 E mail:grimesm@ flash.net

WANTED—INFORMATION

Need manual and information for a Weston 686 Type 12 tube analyzer. Copy OK. Would like to correspond with others who use the Model 686. Joe Pfeifer, P.O. Box 253, Sandy, UT 84091-0253 (801) 571-5453 evenings. E-mail: tubes@worldnet.com

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Any information about Marconi No. 3574 receiver (made by "MWTC, Ltd, London" and similar to a Type III) using carborundum, valve and perikon detectors. George Clemans, 851 West Wooster St., Bowling Green, OH 43402 (419) 352-7198 E-mail: clemans@bgsu.edu

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Need copy of instructions or information on use of Morris Coil Winder with Cams #1,2 & 3 and gears #39, 40, 42 & 44. Thanks. Harry Blesy, 9S740 Clarendon Hills Rd., Hinsdale, IL 60521-7049 phone or fax (630) 789-1793 E-mail: n9cqx@ enaukchicago.com

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Want information on R28-ARC5 VHF radio as to crystal type and frequencies used. Robert Martin, 111 Bancroft, Rochester, NY 14616 (586) 663-4182

WANTED—KEY & TELEGRAPH

Unusual telegraph items such as pre-1870 landline keys and sounders and registers, large spark era keys especially oil break, and oddball bugs such as verticals, left-handed, right angle, miniatures, or magnet driven. Gil Schlehman, 335 Indianapolis, Downers Grove, IL 60515-3112 (630) 968-2320

WANTED—LITERATURE

Need manual/book/chart listing tube socket and settings to test tubes using the Mercury "In Store Self Service Tester" Model 201. Also shown as Model 201F (201C). Bill Ford, VE3CK, Box 606, Smiths Falls, Ontario, Canada K7A 4T6

Would like to buy or copy part of Vol. 11 of AWA Review. Charlie Solie, 1409 Jeanie Ct., Las Cruces, NM 88007 E-mail: WB5LVH@ nmsu.edu

WANTED—PARTS

Radio chassis and clock for Lyric/Wurlitzer

(continued on page 73)

BUSINESS CARD ADS

Are you offering a product or service of interest to antique radio enthusiasts? Would you like to let the world know about the tubes, sets or paper you'd like to acquire? Place a business card in this space for the low price of $15.00 and it will seen by over 4,000 hard core devotees of our hobby. Purchase a year's worth of insertions (four issues) for $50.00 and save $10.00 over the individual ad pricing.

Send us a copy of your business card, or a special typeset ad designed to fit our standard space. We can, alternatively, typeset a short message for you (no more than eight lines, 50 characters max per line, please). For the time being, there will be no charge for typesetting. All ads must be for radio-related items or services and must be paid in advance. Send your ads and checks (payable to AWA) to Robert W. Perry, "Smoke Signals," 131 E. High St., Painted Post, NY 14870. Closing date is six weeks prior to first day of month of issue. **All advertising income is used to further the conservation work of the AWA Electronic Communication Museum.**

CLASSIFIEDS, *continued from page 71*

Model S-6 grandfather clock radio. Any condition and nonworking is OK. Table radio has same chassis. James Fisher, RR1 Box 861, Port Royal, PA 17082 (717) 527-2224 E-mail: yrless@tricountyi-net

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Miller Coils #522, #242A (2 needed), #EL56; Pickett N-16 Electronics slide rule with instructions; Boy Electrician; Boy's First Book of Radio & Electronics by A. Morgan (second & third book in the series needed too! Jim Dapkus, W6575 Dakota Ave., Westfield, WI 53964

Knobs used on mid-1930s Grunows. Knobs for Motorola 53H, all colors. Perfect blue dial knob for Detrola Super Pee Wee. Blue or red Emerson 400 Patriot knobs. All Catalin knobs. Far left-hand knob for Zenith 4R. Have guaranteed good 01As for sale, $12.50 plus postage. Paul Farmer, P.O. Box 352, Washington, VA 22747-0352 (540) 987-8759 E-mail: oldradiotime@hotmail.com

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Etched nameplate (or pencil rubbing) for Majestic Melody Cruiser; Bandspread escutcheon for Hallicrafters SX-28. Alan Dadisman, 1787 Panettah Drive, Alpine, CA 91901 (619) 445-3254 E-mail: akdad@cox.net

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Cabinets only for RCA T-6-1; Heath AT-1. Rough condition OK. Dick Bixler, 14955 N.W. Channa Drive, Portland, OR 97229 (590) 690-2557

WANTED—BC/SW TUBE RADIOS

Crosley "Bandbox" for restoration parts, or any comparable power transformer with 1.5 volts, etc., Paul Recupero, 265 Union St., Portsmouth, RI 02871-2264

Columbia SG-8 radio, 1929-1930 vintage, chassis and speaker only is OK. G. Liccione, 118 Hiawatha Trail, Liverpool, NY 13088 (315) 457-7928

WANTED—COMMUNICATIONS GEAR

National FB-7 or FB-7X, lack of coils no problem. James Fred, 5355 S. 275W, Cutler, IN 46920 (765) 268-2214

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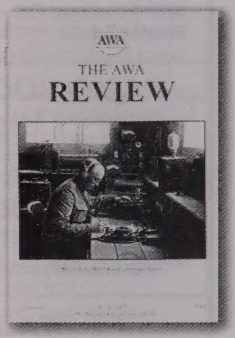
AWA REVIEW VOLUME 15



The AWA Review acts as a showcase for some of the excellent research done by AWA members. This volume represents an attempt to link the articles in the Review more closely with the papers and exhibits at the annual AWA Conference in Rochester, NY. Three of the four articles are based on papers or exhibits at past conferences. The fourth article, although not based on a conference presentation, is particularly timely since it reports on the Marconi Wireless Apparatus on the Titanic as revealed and confirmed by the latest photographs of the radio rooms on the wreck.

The articles cover (1) the role that wireless interception has played intelligence gathering from the first days of wireless communication to the present (by Bart Lee), (2) the exact configuration of the Marconi wireless apparatus as confirmed by recent underwater photographs (by Parks Stephenson), (3) the Radio and Seed Business of Henry Field and a discussion of other early broadcasters who were both radio pioneers and radio entrepreneurs (by George A. Freeman), (4) the history of the Rogers Radio Company and their early AC Tubes (by Maurice Chaplin). A "Cumulative Table of Contents" included at the end of this volume lists the title of every article in every volume of *The AWA Review* since it began publication in 1986. *Price: $24.95 US postpaid in US and Canada; elsewhere, add $5.00.*

THE OTB ON CD ROM

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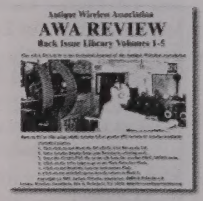

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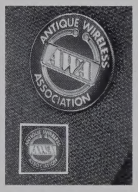

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Heavy porcelain mug in cobalt blue with yellow-gold AWA lettering and logo. good for daily use and dishwasher safe. *$9.75 postpaid in US and Canada.*

Make checks out to "AWA Museum" and send to Ed Gable, Curator, AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468.

RADIO MEN CROSSWORD (answer key), *continued from page page 51*

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QTY	ISSUE	QTY	ISSUE	QTY	ISSUE
_____	Volume 6 $6.00	_____	Volume 9 $13.00	_____	Volume 14 $27.50
_____	Volume 7 $6.00	_____	Volume 10 $13.00	_____	Volume 15 $24.95
_____	Volume 8 $6.00	_____	Volume 13 $16.95		

CD ROM DISKS *Priced as Indicated.*

OTB BACK ISSUE CDS

QTY	DISC	QTY	DISC	QTY	DISCS
_____	Vol. 1 (issues 1-1 thru 25-4) @ $49.95	_____	Vol. 2 (issues 26-1 thru 37-4) @ $49.95	_____	Set: Vol. 1 and Vol. 2 @ $89.95

AWA REVIEW BACK ISSUE CD

QTY	DISC	QTY	DISC
_____	AWA Review Vols. 1 thru 5 @ $19.95	_____	AWA Review Vols. 6 thru 10 @ $19.95
_____	Set of both CDs @ $35.00		

AWA MEMBERSHIP PIN

QTY

_____ Pin @ $6.00

AWA COFFEE MUG

QTY

_____ @ $9.75

ORDER TOTAL CALCULATION *Note: Foreign postage surcharge does not apply to Canada.*

_____ **OTB Back Issues @ $3.00 = $_____**

Subtract $_____ Discount (if any) / Add $3.00 foreign postage if applicable. ***Total OTB Order $_____***

_____ **Indexes (paper or disk) @ $7.00 = $_____**

Subtract $2.00 discount if applicable / Add $1.00 foreign postage if applicable. ***Total Index Order $_____***

_____ **Total AWA Review Cost = $_____**

Add $5.00 per volume foreign postage if applicable. ***Total Review Order $_____***

_____ **Individual OTB Back Issue CDs @ $49.95 = $_____**

Add ____**Vol 1 + Vol 2 sets @ $89.95 = $_____**

Add $5.00 foreign postage if applicable. ***Total OTB CD Order $_____***

_____ **AWA Review CDs @ $19.95 each or $35.00 for both = $_____**

Add $3.00 foreign postage per disk if applicable. ***Total AWA Review CD Order $_____***

_____ **AWA Membership Pin @ $6.00 = $_____**

Add $1.00 foreign postage if applicable. ***Total Membership Pin Order $_____***

_____ **AWA Coffee Mug @ $9.75 = $_____**

Add $1.00 foreign postage if applicable. ***Total Coffee Mug Order $_____***

Grand total of individual total amounts = $_____

Please make your check payable to AWA Museum and send to:
Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468.

Name _____ Address _____

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